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UNITED STATES BUREAU OF MINES
SCOTT TURNER, DIRECTOR

INFORMATION CIRCULAR

RESEARCH ACTIVITIES IN THE MINERAL INDUSTRIES OF THE UNITED STATES

BY

A. C. FIELDNER AND ALDEN H. EMERY

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INFORMATION CIRCULAR

DEPARTMENT OF COMMERCE - BUREAU OF MINES

RESEARCH ACTIVITIES IN THE MINERAL INDUSTRIES OF THE UNITED STATES[1]

A list of problems reported to the Bureau of Mines in 1930 and 1931

By A. C. Fieldner[2] and Alden H. Emery[3]

This list of problems engaging the attention of the mineral industries was prepared under the sponsorship of the committee on correlation of research of the American Institute of Mining and Metallurgical Engineers. Questionnaires were sent to practically all industrial, institutional, university, and governmental research departments. The response was fairly satisfactory. As might be expected, many private commercial corporations did not report individual research problems, but replied in general terms. However, the universities, and the governmental and other public institutions responded freely and submitted lists of problems on which they were working. Grateful acknowledgment is made to all who answered the questionnaires, without whose help no catalogue could have been prepared.

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1 The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6637."

2 Chief engineer, Experiment Stations Division, U. S. Bureau of Mines.

3 Assistant to chief engineer, Experiment Stations Division, U. S. Bureau of Mines.

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For convenience of reference, the problems have been listed in divisions and subdivisions as follows:

A. COAL

I. Occurrence
II. Properties, composition, and testing
III. Mining, safety, and health
IV. Cleaning, preparation, and briquetting
V. Storage, transportation, weathering, and spontaneous combustion
VI. Combustion, furnaces, and smoke abatement (including gas)
VII. Carbonization
VIII. Carbonization products
IX. Complete gasification, hydrogenation, and synthetic products
X. Economics and miscellaneous

B. PETROLEUM, NATURAL GAS, and ASPHALT

I. Origin, geology, and prospecting
II. Properties and tests: Motor fuels and lubricants
III. Properties and tests: Miscellaneous
IV. Development and production
V. Transportation and storage
VI. Refining
VII. Special chemical processing
VIII. Utilization: Motor fuels and lubricants
IX. Utilization: Carbon black
X. Utilization: Furnaces and combustion
XI. Utilization: Miscellaneous
XII. Safety, health, and economics

C. NONMETALLIC MINERALS and PRODUCTS (other than Coal (A), Petroleum, Natural gas, and asphalt (B))

I. Ceramic raw materials
II. Heavy clay products and refractories
III. Porcelain, enamels, glass, and electrical insulators
IV. Porous ceramic products, heat insulators, and asbestos
V. Lime, gypsum and plaster
VI. Cement and concrete (including aggregates)
VII. Sand, gravel, and crushed stone
VIII. Building stone and roofing material
IX. Pigments
X. Mineral fillers, clarifiers, and detergents
XI. Acids, alkalies, salts, and sulphur
XII. Phosphates and their derivatives
XIII. Water, water treatment, and stream pollution
XIV. Safety, health, and miscellaneous

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D. METALLIC ORES AND PRODUCTS

I. Origin, occurrence, prospecting, mining, and economics
II. Beneficiation
III. Methods of analysis and test
IV. Properties: Thermal, electrical, and magnetic
V. Properties: Corrosion, erosion, and embrittlement
VI. Properties: Failure, endurance, fatigue, and crystal structure
VII. Properties: Other mechanical
VIII. Properties: Miscellaneous
IX. Extraction and refining
X. Steel and alloy steel manufacture
XI. Nonferrous metal and alloy manufacture
XII. Casting and melting
XIII. Electroplating and metallic coating
XIV. Welding
XV. Utilization and development
XVI. Safety and health

E. GENERAL

I. Occurrence, prospecting, mining, and economics
II. Beneficiation and transportation
III. Safety and health
IV. Miscellaneous

Individual problems fitting under more than one classification are repeated.

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A. COAL

I. Occurrence

Anthracite Institute (in cooperation with Lehigh University), 90 West Street, New York, N. Y.
Geology and correlation of Pennsylvania anthracite.

Birmingham-Southern College, Department of Geology, Birmingham, Ala.
Cyclic sedimentation in the coal fields of the Birmingham district.

Indiana State Conservation Department, Division of Geology, Indianapolis, Ind.
Origin of Indiana coals.

Iowa Geological Survey, Des Moines, Iowa.
Geology of Iowa coals.

Lehigh University, Department of Geology (in cooperation with the Anthracite Institute), Bethlehem, Pa.
Geology and correlation of Pennsylvania anthracite.

State University of Montana, Department of Geology, Missoula, Mont.
Occurrence, mining, and utilization of Montana coal and lignite.

South Dakota Geological Survey, University of South Dakota, Vermillion, S. Dak.
Location and geology of lignite deposits.

United States Geological Survey, Washington, D. C.
Geologic relations, areal distribution, origin, and quantity of coal available in all deposits.

Vanderbilt University, Department of Geology, Nashville, Tenn.
Distribution and quality of the coals of the western coal field of Kentucky and of the northern coal field of Tennessee.

II. Properties, Composition, and Testing

American Society for Testing Materials (in cooperation with Battelle Memorial Institute), 1315 Spruce Street, Philadelphia, Pa.
Pulverizing characteristics of coal.

American Society for Testing Materials (in cooperation with the United States Bureau of Mines), 1315 Spruce Street, Philadelphia, Pa.
Standardization of the agglutinating test of coal.

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Anthracite Institute (in cooperation with Lehigh University), 90 West Street, New York, N. Y.
The physical and chemical properties of Pennsylvania anthracite, including X-ray and microscopical studies, distillation, and physical measurements, such as specific heats, electrical conductivity, and coefficient of expansion.

Anthracite Institute (in cooperation with Pennsylvania State College), 90 West Street, New York, N. Y.
Properties of anthracite which will permit it to be used as a commercial carbon in the chemical and metallurgical industries.

Anthracite Institute (in cooperation with Yale University), 90 West Street, New York, N. Y.
Ignition of anthracite fuels.

Battelle Memorial Institute (in cooperation with the American Society for Testing Materials), 505 King Avenue, Columbus, Ohio.
Pulverizing characteristics of coal.

Carnegie Institute of Technology, Coal Research Laboratory, Pittsburgh, Pa.
Significance of true density measurements of coal and coke.
High-vacuum distillation to obtain the primary decomposition products of coal.
The action of solvents on coal.
Action of chlorine on coal to determine the nature of coal substance.
Development of microchemical methods for the analysis of coal and its products.

Carnegie Institute of Technology (in cooperation with the United States Bureau of Mines), Pittsburgh, Pa.
Standardization of the agglutinating test of coal.
Chemistry of decay in relation to peat and coal formation.
Occluded gases in coal.

University of Dubuque, 2050 Delhi Street, Dubuque, Iowa.
Fusion point of the ash of various coals.

Fuel Engineering Co. of New York, 116 East 18th Street, New York, N. Y.
Grindability of coal for pulverizer service.

Fuller Lehigh Co., Station 1, Fullerton, Pa.
Comparison of the grindability of coal as indicated by two types of grindability machines.

University of Illinois, Department of Botany, Urbana, Ill.
The botanical contents of coal balls.

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University of Illinois, Engineering Experiment Station, Urbana, Ill.
The character of the organic sulphur in coal.
Friability of Illinois coals.

Iowa Geological Survey, Des Moines, Iowa.
Weathering of Iowa coals.

State University of Iowa, Iowa City, Iowa.
Weathering properties of Iowa coals.
Chemical and thermal values of Iowa coals.

Lehigh University, Bethlehem, Pa.
Chemical constitution of bituminous coals.

Lehigh University, Department of Geology (in cooperation with the Anthracite Institute), Bethlehem, Pa.
The physical and chemical properties of Pennsylvania anthracite, including X-ray and microscopical studies, distillation, and physical measurements such as specific heats, electrical conductivity and coefficient of expansion.

Minneapolis General Electric Co., Minneapolis, Minn.
Ash-fusing characteristics of different coals.

Minnesota By-Product Coke Co., 1203 Van Buren Street, St. Paul, Minn.
Agglutinating value of coal.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
The aqueous tension of lignite.

University of North Carolina, Chapel Hill, N. C.
Study of the inorganic sulphur in coal, including a fundamental study of the thermal decomposition of pyrite and the equilibrium between pyrite, sulphur, and ferrous sulphide.

University of North Dakota, Department of Chemistry, University Station, Grand Forks, N. Dak.
Investigation of benzene extracts of North Dakota lignites.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. Dak.
The chemistry of lignite as shown by oxidation studies (electro-chemical).
Aqueous tension of lignite and other coals.
Specific heat of lignite and other coals.
The colloidal structure of lignite.
X-ray studies of lignite and coke.

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Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Sampling of pulverized coal in coal-air streams.

Ohio Wesleyan University, Delaware, Ohio.
The relation of the ash-forming constituents in coal to the properties of coal, with special reference to Ohio coals.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Friability of anthracite.
A study of the physical and chemical properties of Pennsylvania bituminous coals, with particular reference to the utilization of the coals.
The condition of water in coal and its relationship to coal classification.

Pennsylvania State College, School of Mineral Industries (in cooperation with the Anthracite Institute), State College, Pa.
Properties of anthracite which will permit it to be used as a commercial carbon in the chemical and metallurgical industries.

Pennsylvania Water and Power Co., Lexington Street Building, Baltimore, Md.
Development and use of device for sampling coal deposits in bed of Susquehanna River.

University of Pittsburgh (in cooperation with the United States Bureau of Mines), Pittsburgh, Pa.
Chemistry of decay in relation to peat and coal formation.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Softening characteristics of coal and methods of testing therefor.

Rochester & Pittsburg Coal Co., Indiana, Pa.
Pulverization characteristics of coal from various parts of the Freeport seam.

Rose Polytechnic Institute, Terre Haute, Ind.
Marshall-Bird agglutinating test applied to Indiana coals.

Rutgers University, New Brunswick, N. J.
Microbiology of peat and formation of humic matter.

United States Bureau of Mines, Northwest Experiment Station, Seattle, Wash.
Physical and chemical properties of coal in relation to classification.

United States Bureau of Mines, Northwest Experiment Station (in cooperation with the University of Washington), Seattle, Wash.
Comparison of methods for determining the friability of coal.

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United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Absorption of gases by coal.
A study of the plasticity of coal.
Development of analytical methods involving the extraction of coal with solvents.
Investigation of methods for separating ulmens and resistent plant residues in coal.
Comparison of permanganate and chlorate methods for determining the reactivity of coals.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the American Society for Testing Materials and the Carnegie Institute of Technology), Pittsburgh, Pa.
Standardization of the agglutinating test of coal.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the Carnegie Institute of Technology), Pittsburgh, Pa.
Occluded gases in coal.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the Carnegie Institute of Technology and the University of Pittsburgh), Pittsburgh, Pa.
Chemistry of decay in relation to peat and coal formation.

United States Bureau of Mines, Southern Experiment Station, Tuscaloosa, Ala.
The classification of Alabama coals.

United States Geological Survey, Washington, D. C.
Character of coal in all deposits.

Vanderbilt University, Department of Geology, Nashville, Tenn.
Quality of the coals of the Western coal field of Kentucky and of the Northern coal field of Tennessee.

Virginia Agricultural & Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
Reclassification of Virginia coals.

University of Washington, Seattle, Wash.
Sampling of powdered coal.

University of Washington (in cooperation with the United States Bureau of Mines), Seattle, Wash.
Comparison of methods for determining the friability of coal.

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West Virginia University, College of Engineering, Morgantown, W. Va.
Effects of high pressures on extraction products of bituminous coal.
Investigation of the physical and chemical properties of West Virginia coals.
Agglutinating and coking properties of some West Virginia coals.
Mechanical properties of West Virginia coals.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
Solvent extraction of bituminous coals.
Action of nitric acid on coal in anhydrous media.
Investigation of the physical and chemical properties of West Virginia coals, including friability, crushing strength, specific gravity, and water absorption.

Yale University, New Haven, Conn.
Development of methods for determining the grindability of coal.

Yale University, Department of Mechanical Engineering, Sheffield Scientific School, Mason Laboratory (in cooperation with the Anthracite Institute), 400 Temple Street, New Haven, Conn.
Ignition of anthracite coals.

III. Mining, Safety and Health

American Gas Association Testing Laboratory, 1032 East 62nd Street, Cleveland, Ohio.
Development of standard requirements.

Anthracite Institute (in cooperation with Pennsylvania State College), 90 West Street, New York, N. Y.
A new method of mining anthracite.

Atchison Topeka & Santa Fe Railway Co., Test Department, Crane and Branner Streets, Topeka, Kans.
Investigation of coals used on locomotives and in power plants.

Carnegie Institute of Technology (in cooperation with the United States Bureau of Mines), Schenley Park, Pittsburgh, Pa.
The effect of electric and magnetic fields on flame propagation.

Columbia University, New York, N. Y.
Roof action and subsidence.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Nonquenching gas-range burner.
Safety controls for gas appliances.

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Cutler Hammer (Inc.), 12th and St. Paul Street, Milwaukee, Wis.
Explosion-proof control equipment.

University of Illinois, Engineering Experiment Station, Urbana, Ill.
Coal-mine ventilation.
Accident studies of hand versus mechanical loading in coal mines.
Falls of roof and coal.
Coal mine haulage.

University of Kentucky, Department of Mining and Metallurgy, Lexington, Ky.
The design of a laboratory coal-dust explosion gallery.

Lafayette College, Easton, Pa.
Dust prevention in coal mines.

State University of Montana, Department of Geology, Missoula, Mont.
Occurrence, mining, and utilization of Montana coal and lignite.

Neville Chemical Co., Pittsburgh, Pa.
Toxicity of crude heavy solvent.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Friction at bends in air lines.
Effect of character of wire screens or gauzes in stopping flame in exploding gas-air mixtures.

Pennsylvania State College, School of Mineral Industries (in cooperation with the Anthracite Institute), State College, Pa.
A new method of mining anthracite.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Explosions of coal-dust and other solid materials.
Gas explosions.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Relative safety of different makes of trailing cable.
Electrostatic phenomena in mines.
Disposal of waste waters from mines.
Sealing abandoned mines and determining cause of alkalinity in others.
Relation between mining methods and accidents from falls of roof and coal.
Coal-mining methods and costs.
Ground movement and subsidence.
Occurrence of bumps in mines.
Rock-dusting of coal mines.
Determination of moisture-absorbing, wetting, and caking characteristics of material used for rock-dust barriers.
Behavior of different coal-dusts as regards propagation of flame.

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United States Bureau of Mines - Continued.

Laboratory study of the inflammability of coal and other mineral dusts.
Laboratory investigation of effect of size of coal-dust on inflammability.
Compressibility and crushing strength of the Pittsburgh coal bed.
Effect of change in the quantity of dust present and in the strength of the source of ignition on the explosibility of coal-dust.
Physical tests of explosives to determine their permissibility for use in coal mines.
Collection and testing of field samples of permissible explosives.
Determination of the temperature attained by the products of detonation of explosives.
Development of analytical and testing methods for mine explosives.
Study of pressure waves produced by permissible explosives.
Safe handling and use of liquid-oxygen explosives.
Inflammability of gases and vapors.
Kinetics and mechanism of gaseous explosions.
The specific heats of gases at high temperatures by the explosion method.
Benzol poisoning.
Health hazards from methanol.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with Carnegie Institute of Technology), Pittsburgh, Pa.
The effect of electric and magnetic fields on flame propagation.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the Western Electric Co.), Pittsburgh, Pa.
Explosive properties of acetone-air mixtures.

United States Bureau of Standards, Washington, D. C.
Investigation of the safety of utilization of gas, including the design and performance of gas appliances.

United States Public Health Service, Office of Industrial Hygiene and Sanitation, 16 Seventh Street, S.W., Washington, D. C.
Health of workers exposed to hard and soft coal-dusts.

Western Electric Co. (in cooperation with the United States Bureau of Mines), Chicago, Ill.
Explosive properties of acetone-air mixtures.

West Virginia University, College of Engineering, Morgantown, W. Va.
Coal-mining methods in West Virginia.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
Time studies on different phases of haulage operations and slope and shaft bottoms in West Virginia.
Typical haulage and slope and shaft-bottom layouts.
Relation between tons of coal produced per man and equipment in use per man.

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IV. Cleaning, Preparation and Briquetting

University of Alabama (in cooperation with the United States Bureau of Mines), University, Ala.
Determination of the performance of selected washeries throughout various coal fields of Alabama.

American Smelting & Refining Co., 120 Broadway, New York, N. Y.
Coal and coke briquetting.

Battelle Memorial Institute (in cooperation with Ohio State University), 505 King Avenue, Columbus, O.
The betterment of Ohio coals.

Champlain Valley Lime Co., Winooski, Vt.
Elimination of sulphur from coal.

The Deister Concentrator Co., 901 Glasgow Avenue, Ft. Wayne, Ind.
Separation of stove-flats, cube nut, and pea coal on coal-washing tables.

The Dorr Co.,(Inc.), 247 Park Avenue, New York, N. Y.
Classification and sizing of coal.

General Engineering Co., Salt Lake City, Utah, and 50 Broad Street, New York, N.Y.
Flotation and treatment of fine coal from coal-washing plants.

The Hoover Co., North Canton, Ohio.
Preparation of stoker fuel (cleaning and classification for regulation of particle size).

University of Illinois, Engineering Experiment Station, Urbana, Ill.
Preparation and washability tests of Illinois coals.

University of Illinois, Engineering Experiment Station, Industrial Chemistry Division, Urbana, Ill.
Removal of sulphur from coal.

University of Illinois, Engineering Experiment Station, Chemical Division (in cooperation with the Utilities Research Commission (Inc.), Urbana, Ill.
Removal of impurities from coal.

International Combustion Engineering Corporation, 200 Madison Avenue, New York, N. Y.
Drying and pulverizing coal.

Iowa Geological Survey, Des Moines, Iowa.
Washing of Iowa coals.

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Iowa State College of Agriculture and Mechanic Arts, Iowa Engineering Experiment Station, Ames, Iowa.
Washing Iowa coals.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa.
Washing of Iowa coals.

James Ore Concentrator Co., 35 East Runyon Street, Newark, N. J.
Preparation and beneficiation of coal.

University of Kentucky, Department of Mining and Metallurgy, Lexington, Ky.
Briquetting of bituminous slack coal, using a cold process with a non-volatile organic binder.

Koppers-Rheolaveur Co., 1150 Koppers Building, Pittsburgh, Pa.
Coal preparation and the float-and-sink test applied to coal preparation.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Separation of ash from high-ash coal.
Preparation of briquettes from high-ash coal.
Study of various briquetting methods.

University of Minnesota, Minneapolis, Minn.
Grinding and preparation of dried lignite for powdered fuel purposes.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
The drying of lignite without disintegration.

University of North Carolina, Chapel Hill, N. C.
Elimination of sulphur from North Carolina coals.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. Dak.
Drying of lignite without disintegration, including the study of the mechanism and the physical properties of the processed lignite.

Ohio State University, Engineering Experiment Station (in cooperation with Battelle Memorial Institute), Columbus, Ohio.
The betterment of Ohio coals.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Dewatering and drying of fine coals.

Pacific Coast Coal Co., Seattle, Wash.
Clarification of water from coal washeries.

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Pennsylvania State College, School of Mineral Industries, State College, Pa.
Nature of the action of selective agents in cleaning coal by froth flotation.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Briquetting of low-grade and other coals.

Portland Gas and Coke Company, Public Service Building, Portland, Oreg.
Improving durability of fuel briquets made from carbon residue from oil gas manufacture.

Roanoke College, Salem, Va.
Factors influencing the preparation of coal briquettes.

Rodman Chemical Co., Verona, Pa.
Briquetting of coals.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Preparation of coal briquettes with suitable waterproof properties without the use of tar or smoke-producing binder.

University of Texas, Bureau of Industrial Chemistry, Austin, Tex.
Improvement of lignite as a fuel.

United States Bureau of Mines, Northwest Experiment Station (in cooperation with the University of Washington), Seattle, Wash.
Washability of fine sizes of coal.
Difficulties in cleaning fine coal by froth flotation.
Separation effected by pneumatic coal-washing tables.

United States Bureau of Mines, Southern Experiment Station (in cooperation with the University of Alabama), Tuscaloosa, Ala.
Determination of performance of selected washeries throughout various coal fields of Alabama.

Utilities Research Commission (Inc.), (in cooperation with the University of Illinois), Room 522, 72 West Adams Street, Chicago, Ill.
Removal of impurities from coal.

University of Washington (in cooperation with the United States Bureau of Mines), Seattle, Wash.
Washability of fine sizes of coal.
Difficulties in cleaning coal by froth flotation.
Separation effected by pneumatic coal-washing tables.

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West Virginia University, College of Engineering, Morgantown, W. Va.
Determination of the possibility of preparing the high-sulphur and high-ash coals of northern West Virginia to render them available for the manufacture of by-product coke.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Separating high and low ash anthracite coal, using the principle of attraction and repulsion by electric charges.

V. Storage, Transportation, Weathering, and Spontaneous Combustion

Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
Effect on concrete of acid water from stored bituminous coal.

Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Effect of sulphur water on concrete.

Iowa Geological Survey, Des Moines, Iowa.
Weathering of Iowa coals.
Heating of Iowa coals in storage.
Breakage of Iowa coal in transportation.

State University of Iowa, Iowa City, Iowa.
Rate of heating of Iowa coals in storage.
Weathering properties of Iowa coals.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa
Dusting and slacking tendencies of Iowa coals.
Storage of Iowa coal.

Lehigh Portland Cement Co., Young Building, Allentown, Pa.
Effect of storage on properties of coal.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. Dak.
Spontaneous combustion of lignite.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Improvement of methods for storage of coal.
Spontaneous combustion in stored coal and other materials.

Purdue University, Engineering Experiment Station, Lafayette, Ind.
Causes of spontaneous combustion of stored coal.

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VI. Combustion, Furnaces, and Smoke Abatement (including gas)

(Problems on boiler-water and its treatment are listed under Section C-XIII. Problems on corrosion are listed under Section D-V.)

American Engineering Co., Philadelphia, Pa.
Investigation of automatic dampers for controlling air flow through the fuel bed.
Effect of high-temperature preheated air on the softening of coal.
Effect of high-temperature preheated air on the burning and wasting away of stoker parts.
Effect of high-temperature preheated air on expansion of stoker parts.

American Gas Association (in cooperation with the American Gas Furnace Co. and Mr. Robert Guthrie), 420 Lexington Avenue, New York, N. Y.
Application of gas heat to brass melting.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Consolidated Gas Co. of New York), 420 Lexington Avenue, New York, N. Y.
Applying gas-air jet combustion to bituminous coal.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Consolidated Gas Co. of New York and the C. M. Kemp Manufacturing Co.), 420 Lexington Avenue, New York, N. Y.
Development of immersion stereotype melting equipment.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the C. M. Kemp Manufacturing Co.), 420 Lexington Avenue, New York, N.Y.
Development of gas immersion heating elements for galvanizing tanks.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the University of Michigan), 420 Lexington Avenue, New York, N. Y.
The application of heat to core baking.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the University of Michigan and the Surface Combustion Corporation), 420 Lexington Avenue, New York, N. Y.
The utilization of gas for forging.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the National Machine Works), 420 Lexington Avenue, New York, N. Y.
Improvement of oven-furnace design.

American Gas Association, Committee on Industrial Gas Research (in cooperation with Rutgers University), 420 Lexington Avenue, New York, N. Y.
Improving practices and efficiencies in the utilization of artificial gas in the firing of ceramic wares.

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American Gas Association, Committee on Industrial Gas Research (in cooperation with the Standard Gas Equipment Corporation and the Surface Combustion Corporation), 420 Lexington Avenue, New York, N. Y.
Development of refractory diaphragm burners.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation), 420 Lexington Avenue, New York, N.Y.
Development of large-sized short tunnel burners.

American Gas Association, Testing Laboratory, Cleveland, Ohio.
The elimination of noises in industrial gas burners.
Burning gas with preheated air.
Fundamentals of combustion space requirements in industrial gas furnaces.
Utilization characteristics of butane-air and butane-city gas mixtures.
Ignition velocities of various fuel gases.
Effects of external factors upon the efficiency of gas-fired steam and hot-water radiators.
Development of standard requirements.

American Gas Furnace Co. (in cooperation with the American Gas Association and Mr. Robert Guthrie), Elizabeth, N. J.
Application of gas heat to brass melting.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Combustion and efficient use of fuel in heating furnaces.

American Society of Heating and Ventilating Engineers, Research Laboratory, 4800 Forbes Street, Pittsburgh, Pa.
Study of economical and otherwise satisfactory utilization of coal in heating buildings.
Research in the improvement of methods of testing, and standardization of applicances for heating buildings.

American Society of Heating and Ventilating Engineers (in cooperation with the Carnegie Institute of Technology), 4800 Forbes Street, Pittsburgh, Pa.
Sizes of steam pipes in low-temperature heating systems.

American Society of Mechanical Engineers (in cooperation with the University of Oklahoma), 29 West 39th Street, New York, N. Y.
The efficiencies of boilers used in drilling a rotary-drilled oil well.

American Society of Mechanical Engineers (in cooperation with the United States Bureau of Mines), 29 West 39th Street, New York, N. Y.
Removal of ash as molten slag from powdered-coal furnaces.

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Anthracite Institute Laboratory, Primos, Pa.
General testing and development in connection with the combustion of anthracite, and in connection with the design and operation of anthracite-burning equipment.

Anthracite Institute (in cooperation with Lehigh University), 90 West Street, New York, N. Y.
Combustion tests of Pennsylvania anthracite.

Anthracite Institute (in cooperation with Lehigh University, Pennsylvania State College, and Yale University), Primos, Pa.
Study of equipment for use of anthracite coal.

Armour Institute of Technology, 3300 Federal Street, Chicago, Ill.
Disposal of coal ash when burning powdered coal.

Atchison, Topeka & Santa Fe Railway Co., Test Department, Crane and Branner Streets, Topeka, Kans.
Investigation of coals used on locomotives and in power plants.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Large-scale laboratory study of the mechanism of combustion of pulverized fuel and the effect of fineness, moisture, and other factors on the process.

Brooklyn Edison Co. (Inc.), 380 Pearl Street, Brooklyn, N. Y.
Study of caking characteristics of eastern and southern coals on underfeed stokers.

Bryant Heater & Manufacturing Co., 17825 St. Clair Avenue, Cleveland, Ohio.
General problems connected with utilization of manufactured gas in building heating.

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.
Investigation of dry and wet centrifugal scrubbers for use in boiler plants and chemical processes.

California Agricultural Experiment Station, College of Agriculture, Davis, Calif.
Study of orchard heaters, including weighing smoke per unit volume of gases emitted and correlating with fuel consumption rate.

Carnegie Institute of Technology, Coal Research Laboratory, Schenley Park, Pittsburgh, Pa.
Mechanism of combustion of solid fuels.

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Carnegie Institute of Technology, College of Industries, Schenley Park, Pittsburgh, Pa.
Performance of low-pressure steam-heating boilers.
Performance of unit heaters.

Carnegie Institute of Technology (in cooperation with the American Society of Heating and Ventilating Engineers), Schenley Park, Pittsburgh, Pa.
Sizes of steam pipes in low-temperature heating systems.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
The utilization of manufactured gas for economically and safely heating and humidifying the home under controlled conditions.

Chespeake and Ohio Railway (in cooperation with the University of Kentucky), Richmond, Va.
The suitability of coals along the line of the Chespeake and Ohio Railway for domestic purposes, especially their adaptability for use in small stokers.
Observations of smoke densities, using an electric eye.

Columbia University, Department of Mechanical Engineering, New York, N. Y.
Combustion and furnaces with burners, stokers, and other appliances for heat release from fuels.
Heat transfer processes and apparatus.

Commercial Testing and Engineering Co., 360 North Michigan Avenue, Chicago, Ill
Combustion of coal.

Commonwealth Edison Co., 72 West Adams Street, Chicago, Ill.
Fly-ash and sulphur-fume elimination from flue gases.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Nonquenching gas-range burner.
Safety controls for gas appliances.

Consolidated Gas Co. of New York, Laboratories (in cooperation with the American Gas Association), 4 Irving Place, New York, N. Y.
Applying gas-air jet combustion to bituminous coal.

Consolidated Gas Co. of New York, Laboratories (in cooperation with the American Gas Association and the C. M. Kemp Manufacturing Co.), 4 Irving Place, New York, N. Y.
Development of immersion stereotype melting equipment.

Corning Glass Works, Corning, N. Y.
More effective utilization of gas and coal in the manufacture of glass.
Furnace design.

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Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Furnace gas compositions and temperatures in underfeed stoker-fired boilers and their effect on boiler settings.
The development of uses for pulverized coal ash.

Detroit Edison Co. (in cooperation with the University of Michigan), 2000 Second Avenue, Detroit, Mich.
Spectrographic analysis of gas.

Detroit Edison Co. (in cooperation with the Superheater Co. and Yale University), 2000 Second Avenue, Detroit, Mich.
Radiation, heat absorption, and progress of combustion.

University of Dubuque, 2050 Delhi Street, Dubuque, Iowa.
Fusion point of the ash of various coals and the suitability of the coal for use in firing furnaces with stokers, with special attention to screenings.

C. A. Dunham Co., Marshalltown, Iowa.
Improvement in heating systems for buildings.

Erie City Iron Works, Erie, Pa.
Pulverizing and firing coal in boiler furnaces.

Frost Research Laboratory (Inc.), 1326 Markely Street, Norristown, Pa.
Combustible characteristics of solid fuels.
Development of domestic stoker to burn smallest-sized anthracite and coke.

Fuel Engineering Co. of New York, 116 East 18th Street, New York, N. Y.
Grindability of coal for pulverizer service.
The mechanism of combustion of coal in suspension.

Mr. Robert Guthrie, Consulting Metallurgist (in cooperation with the American Gas Association and the American Gas Furnace Co.), 122 South Michigan Avenue, Chicago, Ill.
Application of gas heat to brass melting.

Hagan Corporation, 304 Ross Street, Pittsburgh, Pa.
Combustion control.

Harvard University, The Harvard Engineering School, Cambridge, Mass.
Smoke prevention and dust catching.
Effects of dust, fumes, and smoke on men and animals.

University of Illinois, Engineering Experiment Station, Urbana, Ill.
Method of removing harmful and corrosive constituents from the flue gases of a power plant.
Performance studies of a stoker-boiler unit.

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University of Illinois (in cooperation with the Utilities Research Commission (Inc.)), Urbana, Ill.
Stack gases and their purification.

University of Illinois, Engineering Experiment Station, Department of Mechanical Engineering (in cooperation with the National Warm Air Heating Association), Urbana, Ill.
Performance of warm-air furnaces and furnace heating systems.

International Combustion Engineering Corporation, 200 Madison Avenue, New York, N. Y.
Combustion of fuels.
Heat transfer from burning fuel and products of combustion to water-cooled surfaces.

Iowa State College of Agriculture and Mechanic Arts, Engineering Experiment Station, Ames, Iowa.
Burning pulverized Iowa coal.
Study of the economy of a gas-fired boiler for domestic heating.

Johns Hopkins University, Baltimore, Md.
A study of chimney performance.

Johns Hopkins University, Department of Mechanical Engineering, Baltimore, Md.
Study of the economic distribution of heating surface in large boilers, between water walls, boiler surface, economizer surface, and air preheater surface.

City of Kalamazoo, Kalamazoo, Mich.
Study of cinder, soot, and ash deposits in the city of Kalamazoo.

Kansas State Agricultural College, Department of Mechanical Engineering, Manhattan, Kans.
The use of oil and gas as fuel in house-heating boilers.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association), Baltimore, Md.
Development of gas immersion heating elements for galvanizing tanks.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association and the Consolidated Gas Co. of New York), Baltimore, Md.
Development of immersion stereotype melting equipment.

University of Kentucky (in cooperation with the Chespeake and Ohio Railway), Lexington, Ky.
The suitability of coals along the line of the Chespeake and Ohio Railway for domestic purposes, especially their adaptability for use in small stokers.
Observation of smoke densities, using an electric eye.

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Kewanee Boiler Corporation, Kewanee, Ill.
Performance characteristics of heating boilers.

Lauks Laboratories (Inc.), 314 Maritime Building, Seattle, Wash.
Powdered-coal burning.
Stoker design.

Lehigh Portland Cement Co., Young Building, Allentown, Pa.
Effect of coal ash on Portland cement composition.

Lehigh University, Department of Geology (in cooperation with the Anthracite Institute), Bethlehem, Pa.
Combustion tests of Pennsylvania anthracite.

Lehigh University (in cooperation with Anthracite Institute Laboratory, Pennsylvania State College, and Yale University), Bethlehem, Pa.
Study of equipment for use of anthracite coal.

Massachusetts Institute of Technology, Department of Fuel and Gas Engineering, Cambridge, Mass.
The mechanism of the combustion of solid carbon.
Heat transmission in furnaces.
Industrial furnace design.

Massachusetts Institute of Technology (in cooperation with the National Research Council), Cambridge, Mass.
Measurement of total radiation from hot gases.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Air pollution in the Pittsburgh area.

University of Michigan, Department of Chemical Engineering, Ann Arbor, Mich.
Development of high temperature heating by means of high boiling organic vapors.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Methods of heating asphalt.
Utilization of pulverized-fuel ash.

University of Michigan, Department of Mechanical Engineering, Ann Arbor, Mich.
Study of the cinder, soot, and ash deposits in a manufacturing city.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Spectrographic analysis of gas.

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University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association), Ann Arbor, Mich.
The application of heat to core baking.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association and the Surface Combustion Co.), Ann Arbor, Mich.
The utilization of gas for forging.

University of Michigan, Department of Engineering Research (in cooperation with the Utilities Research Commission (Inc.)), Ann Arbor, Mich.
Brass melting by city gas.

Minneapolis-Honeywell Regulator Co., Wabash, Ind.
Temperature control in furnaces.

University of Minnesota, Minneapolis, Minn.
Grinding and preparation of dried lignite for powdered-fuel purposes.

Mississippi Valley Research Laboratories (Inc.), 660 South 18th Street, St. Louis, Mo.
Process of combustion of coke in foundry cupolas.

State University of Montana, Department of Geology, Missoula, Mont.
Occurrence, mining, and utilization of Montana coal and lignite.

National Building Units Corporation (in cooperation with the National Cinder Concrete Products Association and the United States Bureau of Standards), 122 East 42nd Street, New York, N. Y.
Cinders or boiler ashes as an aggregate for concrete.

National Cinder Concrete Products Association (in cooperation with the United States Bureau of Standards and the National Building Units Corporation), 1600 Arch Street, Philadelphia, Pa.
Cinders or boiler ashes as an aggregate for concrete.

National Machine Works (in cooperation with the American Gas Association), 1559 Sheffield Avenue, Chicago, Ill.
Improvement of oven furnace design.

National Research Council, Committee on Heat Transmission, 2101 B Street, N.W., Washington, D. C.
Measurement of radiation from nonluminous gases and flames.

National Research Council, Committee on Heat Transmission (in cooperation with the Massachusetts Institute of Technology), 2101 B Street, N.W., Washington, D. C.
Measurement of total radiation from hot gases.

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National Warm Air Heating Association (in cooperation with the University of Illinois), 174 East Long Street, Columbus, Ohio.
Performance of warm-air furnaces and furnace heating systems.

New York Edison System, 4 Irving Place, New York, N. Y.
Elimination of cinders from stacks by improved collecting device.
Investigation of possible hydrocarbon stack loss.
Effect of introducing overfire air over each retort of underfeed stoker.
Study of improvement in operation of stoker-fired boilers by changing relation of forced and induced draft.

Norfolk and Western Railway, Roanoke, Va.
Tests of automatic domestic stokers with various coals produced along the line of the Norfolk and Western Railway.

University of North Dakota, University Station, Grand Forks, N. Dak.
Lignite combustion equipment, including stokers for domestic use.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. Dak.
Combustion of pulverized lignite.
Boiler tests with stoker and grate equipment burning lignite.
Testing of domestic stoker equipment burning lignite.

Northern States Power Co., 15 South 5th Street, Minneapolis, Minn.
Combustion of coal.
Determination of fusibility of coal ash and interpretation of results in terms of furnace operation.

The Ohio Brass Co., Mansfield, Ohio.
Use of pulverized coal in metallurgical and boiler furnaces.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Tests of the utilization of Ohio coals in boiler operation.

Ohio State University, Engineering Experiment Station (in cooperation with the United States Bureau of Mines), Columbus, Ohio.
The application of stokers to ceramic kilns.
A study of the burning characteristics of fuels in ceramic kilns.

University of Oklahoma, School of Mechanical Engineering (in cooperation with the American Society of Mechanical Engineers), Norman, Okla.
The efficiencies of boilers used in drilling a rotary-drilled oil well.

Oregon State Agricultural College, Department of Mechanical Engineering, Corvallis, Oreg.
Study of the burning of fuels in a furnace wherein pressure is maintained at about 7 atmospheres.
Introduction into boilers of make-up steam instead of make-up water.

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Pacific Coast Coal Co., Seattle, Wash.
Utilization of high combustible waste.

Pennsylvania-Ohio Power & Light Co., Toronto Station, Youngstown, Ohio.
Investigation of factors influencing removal of ash as molten slag from furnaces burning pulverized coal.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Combustibility and reactivity of coke in the blast furnace.
A study of the physical and chemical properties of Pennsylvania, bituminous coals with particular reference to the utilization of the coals.

Pennsylvania State College (in cooperation with Anthracite Institute, Lehigh University and Yale University), State College, Pa.
Study of equipment for use of anthracite coal.

Pennsylvania Water & Power Co., Lexington Street Building, Baltimore, Md.
Studies on minimizing fly-ash from boilers and dust from coal pulverizing.
Dust-collection tests on coal-pulverizing mills and powdered-coal furnaces

Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, Ill.
Fundamental processes of gaseous combustion.

Pittsburgh Plate Glass Co., Window Glass Research Department, Mt. Vernon, Ohio.
Use of producer gas in window-glass melting.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., and New York, N. Y., and elsewhere.
Coke plant smoke injury.

Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Study of smoke abatement in the metropolitan district.
Comparative tests of house-heating boilers using coal, oil, and gas.
Comparative tests of automatic temperature controls.
Study and comparative tests of gas-burner venturis.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Nuisances and risks from the burning of powdered coal and other fuels.
Mechanism of the burning of coal on mechanical stokers.
Burning characteristics of coke, semicoke, coals, and other fuels.

Public Service Electric & Gas Co., Newark, N. J.
Tests to determine weight of solids carried by flue gas from underfeed stoker and loss of efficiency due to combustible matter in soot.

Purdue University, Engineering Experiment Station, Lafayette, Ind.
Study of small stokers utilizing Indiana coal.

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Purdue University, School of Chemical Engineering, Lafayette, Ind.
Study of possibilities for utilization of fly-ash or flue-dust from powdered coal.

Purdue University, Engineering Experiment Station (in cooperation with the Indiana Gas Association), Lafayette, Ind.
Comparative heating value of gas, oil, coal, and coke in house heating.

Research Corporation, Bound Brook, N. J., and Washington, D. C.
Elimination of sulphur fumes from combustion gases.
Utilization of pulverized-fuel ash.

W. S. Rockwell Co., South Church Street, New York, N. Y.
Better methods of utilizing coal and gas for industrial heating operations in the metal, ceramic, and chemical industries through improved furnace design.

Rodman Chemical Co., Verona, Pa.
Pulverizing of coal.

Rutgers University (in cooperation with the American Gas Association), New Brunswick, N. J.
Improving practices and efficiencies in the utilization of artificial gas in the firing of ceramic wares.

St. Louis, Citizens Smoke Abatement League of, St. Louis, Mo.
Photographic recording of smoke.

Singmaster & Breyer, Metallurgical and Chemical Engineers, Room 2831, 420 Lexington Avenue, New York, N. Y.
Anthracite-dust as a boiler fuel.

South Dakota State School of Mines, Rapid City, S. Dak.
The utilization of lignite.

Standard Gas Equipment Corporation (in cooperation with the American Gas Association and the Surface Combustion Corporation), 18 East 41st Street, New York, N. Y.
Development of refractory diaphragm burners.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Application of fuels to household and industrial heating plants and gas manufacture.

Stevens Institute of Technology, Hoboken, N. J.
Study of atmospheric contamination, its sources as relating to fuel combustion, its effect, both mechanical and chemical.

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Stitzer and Waddell, 1540 Nicholas Building, Toledo, Ohio.
Adaptation of gas-burner equipment for use with various fuel gases.

Superheater Co. (in cooperation with the Detroit Edison Co. and Yale University), 17 East 42nd Street, New York, N. Y.
Radiation, heat absorption, and progress of combustion.

Surface Combustion Corporation, 2375 Dorr Street, Toledo, Ohio.
Applications of new methods of combustion to metallurgical operations.

Surface Combustion Corporation (in cooperation with the American Gas Association), 2375 Dorr Street, Toledo, Ohio.
Development of large-sized short-tunnel burners.

Surface Combustion Corporation (in cooperation with the American Gas Association and the University of Michigan), 2375 Dorr Street, Toledo, Ohio.
The utilization of gas for forging.

Surface Combustion Corporation (in cooperation with the American Gas Association and the Standard Gas Equipment Corporation), 2375 Dorr Street, Toledo, Ohio.
Development of refractory diaphragm burners.

United Electric Light & Power Co., Sherman Creek Station, New York, N. Y.
Determination of efficiency of bleeder-type Cottrell precipitation on stoker and pulverized-fuel-fired boilers.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Tests of secondary air mixing devices for domestic furnaces.
Determination of relative availability of cokes for use in domestic-heating furnaces.
Effect of preheated air on fuel-bed characteristics.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the American Society of Mechanical Engineers), Pittsburgh, Pa.
Removal of ash as molten slag from powdered-coal furnaces.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the Ohio State University), Pittsburgh, Pa.
A study of the burning characteristics of fuels in ceramic kilns.
The application of stokers to ceramic kilns.

United States Bureau of Standards, Washington, D. C.
Investigation of the safety and efficiency of utilization of gas.
Standards for gas service. The best practice and the requirements made by municipal and state regulatory bodies in the manufacture, distribution, metering, and utilization of fuel gases by public utilities.

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United States Bureau of Standards (in cooperation with the National Building Units Corporation and the National Cinder Concrete Products Association), Washington, D. C.
Cinders or boiler ashes as an aggregate for concrete.

Utah Coal Producers Association (in cooperation with the University of Utah), 709 Ezra Thompson Building, Salt Lake City, Utah.
Study of the adaptability of small overfeed stokers for firing brick kilns.
Tests of McVey combustion chamber.

University of Utah, Engineering Experiment Station (in cooperation with the Utah Coal Producers Association), Salt Lake City, Utah.
Study of the adaptability of small over feed stokers for firing brickkilns.
Tests of McVey combustion chamber.

Utilities Research Commission (Inc.) (in cooperation with the University of Illinois), 72 West Adams Street, Chicago, Ill.
Stack gases and their purification.

Utilities Research Commission (Inc.) (in cooperation with the University of Michigan), 72 West Adams Street, Chicago, Ill.
Brass melting by city gas.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
The design of a more efficient residence furnace for use with a stoker.
The development of a better domestic stoker for lignite coals.
Development of an improved hot-water furnace for domestic use.

Washington University, St. Louis, Mo.
Quantitative measurement of atmospheric smoke pollution.

University of Washington, Mechanical Engineering Department, Seattle, Wash.
Selection of Western Washington coals suitable for powdered coal installations.

West Virginia University, College of Engineering, Morgantown, W. Va.
Design and investigation of automatic feeding devices for residence-heating boilers.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
A study of the mechanism of the kinetics of the homogeneous oxidation of hydrocarbons.
The mechanism of combustion of coal. I. Combustion of pulverized coal. II. Combustion of lump coal. (A theoretical study of the kinetics of the combustion of coal under conditions approximating those existing in industrial furnaces.)

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Yale University, Department of Mechanical Engineering, Sheffield Scientific School, Mason Laboratory, 400 Temple Street, New Haven, Conn.
Performance of low-pressure heating boilers using various fuels.
The combustion process in power boiler furnaces.
Performance of pulverized coal in marine steam boilers.
Economic performance of furnaces, and boilers, radiators, heat cabinets, hotblast heaters, etc.

Yale University (in cooperation with Anthracite Institute, Lehigh University, and Pennsylvania State College), New Haven, Conn.
Study of equipment for use of anthracite coal.

Yale University (in cooperation with the Detroit Edison Co. and the Superheater Co.), New Haven, Conn.
Radiation, heat absorption, and progress of combustion.

VII. Carbonization

University of Alabama, School of Chemistry, Metallurgy and Ceramics, University Post Office, Ala.
Low-temperature carbonization (575°F.) of Alabama coals (using 30-pound samples) to determine yield of char, tar, and gas.

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Low-temperature carbonization of coal.

American Gas Association (in cooperation with the United States Bureau of Mines), 420 Lexington Avenue, New York, N. Y.
Development of methods for determining gas and coke making properties of coal.

Babcock and Wilcox, New York, N. Y.
Low-temperature carbonization of coal.

Battelle Memorial Institute (in cooperation with the Ohio State University), 505 King Avenue, Columbus, Ohio.
The continuous carbonization of coarsely powdered coal (White process) in a 1-ton vertical retort with recovery and analysis of the products.

Carnegie Institute of Technology, Coal Research Laboratory, Pittsburgh, Pa.
Mechanism of coking.
Influence of heating rate and final temperature on properties of derivatives of coal.
Energy relations involved in coking.

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Colorado College, Colorado Springs, Colo.
Determination of quality and quantity of gas, coke, and by-products obtained in the low-temperature carbonization of Colorado subbituminous coals.

Columbia University, New York, N. Y.
Study of gases and tar vapors evolved from coal at successively higher temperatures and the thermal decomposition of the same.

Combustion Utilities Corporation, 60 Wall Street, New York, N. Y.
Low-temperature carbonization of coal.

Continental Industrial Engineers (Inc.), 201 North Wells Street, Chicago, Ill.
Low-temperature distillation of coal.

Crowley Tar Products Co., 415 Lexington Avenue, New York, N. Y.
Carbonization of bituminous coals, especially at low temperatures.

The Detroit Testing Laboratory, 554 Bagley Avenue, Detroit, Mich.
Low-temperature distillation of coal.

Dittlinger-Crow Process Co., New Braunfels, Tex.
Low-temperature carbonization.
Destructive distillation of fuels.

Du Pont Ammonia Corporation, Wilmington, Del.
Coke production.

Internation Combustion Engineering Corporation, 200 Madison Avenue, New York, N. Y.
Carbonization of coal at low temperatures.

Iowa Geological Survey, Des Moines, Iowa.
Coking of Iowa coals.

Iowa State College of Agriculture and Mechanic Arts, Iowa Engineering Experiment Station, Ames, Iowa.
Destructive distillation of Iowa coal.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa.
Carbonization of Iowa coals.

University of Kentucky, Department of Mines and Metallurgy, Lexington, Ky.
The low-temperature carbonization of carbonaceous materials with special reference to oil shales, and cannel and bituminous coals.

Louisville Cement Corporation, 315 Guthrie Street, Louisville, Ky.
Low-temperature carbonization of eastern Kentucky coals.

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Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Coke fellowship.

University of Michigan, Department of Chemical Engineering, Ann Arbor, Mich.
Instantaneous carbonization of coal.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Special processes of coke manufacture.
Carbonization of crushed coal.

University of Minnesota, Minneapolis, Minn.
High and low temperature distillating of lignite and an investigation of the products obtained.

National Electric Heating Co., Incorporated, 154 Nassau Street, New York, N.Y.
Low-temperature carbonization as applied to pretreatment of pulverized coal in central station practice.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. Dak.
Coking of lignite, including a study of the effect of inorganic salts on the process.

Ohio State University, Engineering Experiment Station (in cooperation with Battelle Memorial Institute), Columbus, Ohio.
Vertical retort tests of the White process of carbonization.

The Pawtucket Gas Co., Pawtucket, R. I.
Use of gas oil in the manufacture of coal gas.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Low-temperature distillation of Pennsylvania coals.

University of Pittsburgh, Pittsburgh, Pa.
Coal distillation.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Mechanism of coal carbonization.
Processing of low-grade and other coals by carbonization.

The United Gas Improvement Co., Physical Laboratory, 3101 Passyunk Avenue, Philadelphia, Pa.
Methods of carbonization.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
The plastic state of coal during coking.

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United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with the American Gas Association), Pittsburgh, Pa.
Development of methods for determining gas and coke making properties of coal.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
The coking of semianthracite coal of Virginia.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
Low-temperature carbonization of coal.
The economics of coal carbonization.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
Carbonization of West Virginia coals.

Yale University, Chemical Engineering Department, Sterling Chemistry Laboratory, 225 Prospect Street, New Haven, Conn.
Carbonization of bituminous-coal briquets to obtain a product of high specific gravity.
Studies of behavior of coals under carbonizing conditions.
Manufacture of artificial anthracite from bituminous coal.

VIII. Carbonization Products

(Problems on paints in general are listed under Section C-IX)

University of Alabama, University, Ala.
Composition and utilization of tars.

American Gas Association, 420 Lexington Avenue, New York, N. Y.
Commercial refrigeration with gas.

American Gas Association, Testing Laboratory, Cleveland, Ohio.
Characteristics of mixed gases.

American Gas Association (in cooperation with Johns Hopkins University), 420 Lexington Avenue, New York, N. Y.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Consolidated Gas Co. of New York, the Dallas Gas Co., the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), 420 Lexington Avenue, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

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American Petroleum Institute (in cooperation with the United States Geological Survey), 250 Park Avenue, New York, N. Y.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

American Railway Engineering Association (in cooperation with the American Society for Testing Materials, the American Wood Preservers' Association, and the United States Bureau of Standards), 431 South Dearborn Street, Chicago, Ill.
Determination of the expansion factor of creosote oil.

American Society of Refrigerating Engineers (in cooperation with the United States Bureau of Standards), 37 West 39th Street, New York, N. Y.
Thermal properties of ammonia and other refrigerants.

American Society for Testing Materials (in cooperation with the American Railway Engineering Association, the American Wood Preservers' Association, and the United States Bureau of Standards), 1315 Spruce Street, Philadelphia Pa.
Determination of the expansion factor of creosote oil.

American Tar Products Co., Koppers Building, Pittsburgh, Pa.
Improvement of coal-tar products for road building.
Improvements in creosote and other wood preservatives.
The development of new uses and the extension of existing uses for pitch.
Investigation of methods of coking pitch.
Investigation of the recovery and utilization of tar acids.
The general utilization of coal-tar products.

American Wood Preservers' Association (in cooperation with the American Society for Testing Materials, the American Railway Engineering Association, and the United States Bureau of Standards), 228 North La Salle Street, Chicago, Ill.
Determination of the expansion factor of creosote oil.

Armour Institute of Technology, 3300 Federal Street, Chicago, Ill.
Removal of sulphur compounds from coal gas by means of an alkaline arsenite solution and the recovery of by-products from this solution.

The Barrett Co., 40 Rector Street, New York, N. Y.
Benzol and tar acid refining.
Production of naphthalene, anthracene, acenaphthene and other hydrocarbons
Improvements in road materials and rubber softeners.
Coal-tar products for pipe-line protection, paints, and plastic cements.

The Brooklyn Union Gas Co., 191 St. James Place, Brooklyn, N. Y.
Cracking problems of gas oil.

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Samuel Cabot (Inc.), 141 Milk Street, Boston, Mass.
Effect of time and temperatures on the compounds formed by the distillation of tars.
Improvement in yield and grade of lampblack (from coal-tar distillation) by contact catalysts and by temperature control.

Carnegie Institute of Technology (in cooperation with the United States Bureau of Mines), Pittsburgh, Pa.
Composition of low-temperature tar: stability of symmetrical xylenol.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
The utilization of manufactured gas for economically and safely heating and humidifying the home under controlled conditions.

Celluloid Corporation, 290 Ferry Street, Newark, N. J.
Purification of cresylic acid for the manufacture of trycresyl phosphate (camphor substitute).

Coleman and Bell Co., Norwood, Ohio.
Conversion of coal-tar products into various dyestuffs.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Utilization of manufactured gas for cutting and welding.

Consolidated Gas Co. of New York (in cooperation with the American Gas Association, the Dallas Gas Co., the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), 4 Irving Place, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

Continental Industrial Engineers (Inc.), 201 North Wells Street, Chicago, Ill.
Processing of coal by-products.

Dallas Gas Co. (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), Dallas, Tex.
Development of gas-operated house-cooling and air-conditioning equipment.

Darco Corporation, Delaware Trust Building, Wilmington, Del.
Manufacture of active carbon from Texas lignite.

Du Pont Ammonia Corporation, Wilmington, Del.
By-products utilization.

Firestone Tire & Rubber Co., Firestone Park, Akron, Ohio.
Coal-tar products as softeners, antioxidants, or accelerators of vulcanization of rubber.

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French Battery Co., 2317 Winnebago Street, Madison, Wis.
Coke utilization in dry-cell manufacture.

The B. F. Goodrich Co., Akron, Ohio.
The utilization of coal products for use in the rubber industry.

Institute of Paint and Varnish Research, 2201 New York Avenue, N.W., Washington, D. C.
Investigation of paint thinners.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa.
The catalytic oxidation of hydrogen sulphide in fuel gas.

Jackson Engineering Corporation, 11 East Fifth Avenue, Tulsa, Okla.
Use of triethanolamine in absorption of hydrogen sulphide and carbon dioxide from gases.
Recovery of sulphur or disposal of hydrogen sulphide from foul gases.

Johns Hopkins University, School of Engineering, Department of Gas Engineering, Baltimore, Md.
The origin and decomposition of organic sulphur compounds under gas-making conditions, with special reference to the rôle of the carbon-sulphur complex.
Manufacture of gas with special reference to the purification of the gas and the recovery of synthetic products.

Johns Hopkins University (in cooperation with the American Gas Association), Baltimore, Md.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

Koppers Co. (in cooperation with the Mellon Institute of Industrial Research), Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Coke fellowship.

Lehigh University, Bethlehem, Pa.
The reactivity of various blast furnace and metallurgical cokes to oxygen.

Lehigh University, Department of Chemistry, Bethlehem, Pa.
The absorption of gases in liquids relative to the design and operation of light-oil absorption towers.

Los Angeles Gas and Electric Corporation, Los Angeles, Calif.
Manufacture of gas from oil.

Maltbie Chemical Co., 246 High Street, Newark, N. J.
Study of creosote.

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Marquette University, Department of Chemistry, 1217 Wisconsin Avenue, Milwaukee, Wis.
The properties and reactions of triethanolamine and chlorinated napthelenes.

Mattin Laboratories, 220 25th Street, Brooklyn, N. Y.
Chlorination of coal-tar derivatives.

Mellon Institute of Industrial Research (in cooperation with the Koppers Co.), Thackerary Avenue and O'Hara Street, Pittsburgh, Pa.
Coke fellowship.

Metric Metal Works, Erie, Pa.
Gas measurement.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
General problems relating to the manufacture and utilization of manufactured gas.
Dehumidifying city gas.

Mississippi Valley Research Laboratories (Inc.), 660 South 18th Street, St. Louis, Mo.
Gasification of crude oils.

National Carbon Co. (Inc.), Cleveland, Ohio.
Production of carbon electrodes from coke and anthracite.

The Naugatuck Chemical Co., Naugatuck, Conn.
Development of rubber accelerators and antioxidants from coal tar.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Properties of coal and coke in relation to their use as reducing agents in the manufacture of zinc.

Pacific Gas & Electric Co., 4245 Hollis Street, Emeryville, Calif.
The gravity and distillation fractionation of coal-tar creosote which will afford maximum economy with best protection for wooden poles in butt treating by the open-tank method.
Production of gas from California coals.

The Pawtucket Gas Co., Pawtucket, R. I.
Purification and utilization of coal gas.
Deterioration of meters.

Peerless Color Co., 521-535 North Avenue, Plainfield, N. J.
Manufacturing of synthetic dyes, principally of the vat-dye group, using coal-tar intermediates of various kinds.

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Peoples Gas Light & Coke Co. (in cooperation with the American Gas Association, the Dallas Gas Co., the Consolidated Gas Co. of New York, and the Silica Gel Corporation), 122 South Michigan Avenue, Chicago, Ill.
Development of gas-operated house-cooling and air-conditioning equipment.

Walter J. Podbielniak, Research Chemical Engineer, 1208 Medical Arts Building, Tulsa, Okla.
Development of precise fractional distillation and other methods for separation of natural and manufactured gas into the individual hydrocarbons (or very close cut fractions) present.

Portland Gas & Coke Co., Public Service Building, Portland, Oreg.
Recovery of by-products from spent oxide-gas purification material.

Purdue University, Engineering Experiment Station (in cooperation with the Indiana Gas Association), Lafayette, Ind.
Comparative heating value of gas, oil, coal, and coke in house heating.

Purdue University, Engineering Experiment Station (in cooperation with the Utilities Research Commission (Inc.)), Lafayette, Ind.
Determination of proper welding procedure for welding with manufactured (city) gas.

The Reilly Chemical Co., 1617 Merchants Bank Building, Indianapolis, Ind.
Processing and utilization of coal-tar products.
Development of flotation reagents.

Robertshaw Thermostat Co., Youngwood, Pa.
Physical characteristics of heating gases.
Physical characteristics of gaseous filled thermostatic bellows.

Rodman Chemical Co., Verona, Pa.
Development of carburizing compounds.
Preparation of activated carbon.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Use of fertilizers including phosphates, limestones, marls, potash minerals, nitrates, sulphur, ammonium salts, etc.

Silica Gel Corporation (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Dallas Gas Co., and the Peoples Gas Light & Coke Co.), Garratt Building, Baltimore, Md.
Development of gas-operated house-cooling and air-conditioning equipment.

Harold L. Simons (Inc.), 27 44th Road, Long Island City, N. Y.
Coal-tar products as applied to solvents and synthetic pharmaceuticals and aromatic products.

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Foster D. Snell, 130 Clinton Street, Brooklyn, N. Y.
Maintaining of proper safety standards of mineral solvents as used in dry cleaning and related industries, before and after treatment for reuse.

Stackpole Carbon Co., Tannery Street, St. Marys, Pa.
Application of carbons and carbon contacts to brake linings.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Use of gas as an internal combustion engine fuel.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Application of fuels to household and industrial heating plants and gas manufacture.

University of Tennessee, Agricultural Experiment Station, Knoxville, Tenn.
Comparison of ammoniates as fertilizers.

Thiokol Corporation, Yardville, N. J.
Manufacture of a rubber-like substance from ethylene and sulphur.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Development of methods for analyzing low-temperature tar.
Development of methods for analyzing light oils.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with Carnegie Institute of Technology), Pittsburgh, Pa.
Composition of low-temperature tar: Stability of symmetrical xylenol.

United States Bureau of Standards, Washington, D. C.
Standards for gas service. The best practice and the requirements made by municipal and state regulatory bodies in the manufacture, distribution, metering, and utilization of fuel gases by public utilities.

United States Bureau of Standards (in cooperation with the American Society of Refrigerating Engineers), Washington, D. C.
Thermal properties of ammonia and other refrigerants.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials, the American Railway Engineering Association, and the American Wood Preservers' Association), Washington, D. C.
Determination of the expansion factor of creosote oil.

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United States Geological Survey (in cooperation with the American Petroleum Institute), Washington, D. C.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

Agricultural College of Utah, Experiment Station, Logan, Utah.
Use of ammonium sulphate as fertilizer.

Utilities Research Commission (Inc.) (in cooperation with Purdue University), Room 522, 72 West Adams Street, Chicago, Ill.
Determination of proper welding procedure for welding with manufactured (city) gas.

Washington University, St. Louis, Mo.
Study of by-products that may be economically obtained from tar residues resulting from the low-temperature distillation of Illinois coals.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
The recovery and processing of light oil, coal tar, and ammonia.
The development of new uses of low-temperature tar and its constituents.
The statistical and competitive position of ammonia and coal tar and the products derived therefrom.

Westinghouse Electric & Manufacturing Co., Research Laboratories, Ardmore Boulevard, East Pittsburgh, Pa.
Production of electrical insulating materials from coal-tar products.

West Virginia University, College of Engineering, Morgantown, W. Va.
Investigation of coal tar from by-product ovens.
Distillation products of West Virginia shales and cannel coals.

The Wilbur White Chemical Co., Owego, N. Y.
Processes for making organic intermediates from coal-tar products.

IX. Complete Gasification, Hydrogenation, and Synthetic Products

American Gas Association, 420 Lexington Avenue, New York, N. Y.
Commercial refrigeration with gas.

American Gas Association, Testing Laboratory, Cleveland, Ohio.
Characteristics of mixed gases.

American Gas Association (in cooperation with Johns Hopkins University), 420 Lexington Avenue, New York, N. Y.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

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American Gas Association, Committee on Industrial Gas Research (in cooperation with the Consolidated Gas Co. of New York, the Dallas Gas Co., the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), 420 Lexington Avenue, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

American Petroleum Institute (in cooperation with the United States Geological Survey), 250 Park Avenue, New York, N. Y.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

The Brooklyn Union Gas Co., 191 St. James Place, Brooklyn, N. Y.
Cracking problems of gas oil.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
The utilization of manufactured gas for economically and safely heating and humidifying the home under controlled conditions.

The Chemical Service Laboratories (Inc.), 18th and Cherry Streets, Philadelphia, Pa.
Laboratory evaluation of oils used to carburet blue water gas.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Utilization of manufactured gas for cutting and welding.

Consolidated Gas Co. of New York (in cooperation with the American Gas Association, the Dallas Gas Co., the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), 4 Irving Place, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

Continental Industrial Engineers (Inc.), 201 North Wells Street, Chicago, Ill.
Preparation of partial oxidation compounds of coal.

Corning Glass Works, Corning, N. Y.
Elimination of water from producer gas and manufacture of producer gas which will burn to minimum flue-gas moisture content.
Metering raw producer gas.

Dallas Gas Co. (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), Dallas, Tex.
Development of gas-operated house-cooling and air-conditioning equipment.

Du Pont Ammonia Corporation, Wilmington, Del.
Hydrogen production and purification.
Coke water gas production and purification.
Gas compression and catalyzation.
Ammonia and alcohol synthesis and utilization, including ammoniation of phosphatic fertilizers.
Studies of general high-pressure synthesis within the field of catalytic gas reactions.

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Goodyear Tire & Rubber Co., Akron, Ohio.
Synthesis of useful organic compounds such as butyl chloride, butyl alcohol, and formaldehyde from methane and low-boiling hydrocarbons.

University of Illinois, Engineering Experiment Station, Industrial Chemistry Division, Urbana, Ill.
The hydration of unsaturated hydrocarbons.
The partial oxidation of hydrocarbons (also other organic compounds) in the vapor and liquid phases.

Institute of Paint and Varnish Research, 2201 New York Avenue, N. W., Washington, D. C.
Investigation of paint thinners.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa.
The catalytic oxidation of hydrogen sulphide in fuel gas.

Jackson Engineering Corporation, 11 East Fifth Avenue, Tulsa, Okla.
Use of triethanolamine in absorption of hydrogen sulphide and carbon dioxide from gases.
Recovery of sulphur or disposal of hydrogen sulphide from foul gases.

Johns Hopkins University, School of Engineering, Department of Gas Engineering, Baltimore, Md.
Investigation of the manufacture of water gas, with special reference to the decomposition of steam.
The origin and decomposition of organic sulphur compounds under gas-making conditions, with special reference to the rôle of the carbon-sulphur complex.
Manufacture of gas, with special reference to the purification of the gas and the recovery of synthetic products.

Johns Hopkins University (in cooperation with the American Gas Association), Baltimore, Md.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

Kansas State Agricultural College, Engineering Experiment Station, Manhattan, Kans.
Hydrogenation of Kansas coals.

Los Angeles Gas & Electric Corporation, Los Angeles, Calif.
Manufacture of gas from oil.

Louisville Cement Corporation, 315 Guthrie Street, Louisville, Ky.
Study of the hydrogenation of coal and coal products.

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Marquette University, Department of Chemistry, 1217 Wisconsin Avenue, Milwaukee, Wis.
The properties and reactions of triethanolamine and chlorinated napthelenes.

Metric Metal Works, Erie, Pa.
Gas measurement.

Michigan Gas Association (in cooperation with the University of Michigan), 47 North Division Avenue, Grand Rapids, Mich.
Utilization of gas oils and other enrichers for making water gas.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
General problems relating to the manufacture and utilization of manufactured gas.
Use of sodium carbonate in gas-producer practice.
Dehumidifying city gas.

University of Michigan, Department of Engineering Research (in cooperation with the Michigan Gas Association), Ann Arbor, Mich.
Utilization of gas oils and other enrichers for making water gas.

Mississippi Valley Research Laboratory (Inc.), 660 South 18th Street, St. Louis, Mo.
Gasification of crude oils.

Pacific Gas & Electric Co., 4245 Hollis Street, Emeryville, Calif.
Production of gas from California coals.

The Pawtucket Gas Co., Pawtucket, R. I.
The utilization of water gas.
Deterioration of meters.
Purification of water gas.
Use of gas oil in the manufacture of water gas.

Peoples Gas Light & Coke Co. (in cooperation with the American Gas Association, the Silica Gel Corporation, the Consolidated Gas Co. of New York, and the Dallas Gas Co.), 122 South Michigan Avenue, Chicago, Ill.
Development of gas-operated house-cooling and air-conditioning equipment.

Pittsburgh Plate Glass Co., Window Glass Research Department, Mt. Vernon, Ohio.
Manufacture of raw producer gas.

Walter J. Podbielniak, Research Chemical Engineer, 1208 Medical Arts Building, Tulsa, Okla.
Development of precise fractional distillation and other methods for separation of natural and manufactured gas into the individual hydrocarbons (or very close cut fractions) present.

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Portland Gas & Coke Co., Public Service Building, Portland, Oreg.
Improving durability of fuel briquets made from carbon residue from oil-gas manufacture.
Recovery of by-products from spent oxide gas purification material.

Purdue University, Engineering Experiment Station (in cooperation with the Utilities Research Commission (Inc.)), Lafayette, Ind.
Determination of proper welding procedure for welding with manufactured (city) gas.

Rensselaer Polytechnic Institute, Troy, N. Y.
Equilibrium in the water-gas reaction.

Silica Gel Corporation (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Dallas Gas Co., and the Peoples Gas Light & Coke Co.), Garratt Building, Baltimore, Md.
Development of gas-operated house-cooling and air-conditioning equipment.

Robertshaw Thermostat Co., Youngwood, Pa.
Physical characteristics of heating gases.
Physical characteristics of gaseous [illegible] filled thermostatic bellows.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Use of gas as an internal combustion engine fuel.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Application of fuels to household and industrial heating plants and gas manufacture.

Sun Oil Co., 1608 Walnut Street, Philadelphia, Pa.
The hydrogenation of various types of coal for the production of hydrocarbon oils.

The United Gas Improvement Co., Physical Laboratory, 3101 Passyunk Avenue, Philadelphia, Pa.
The reformation of hydrocarbons.
Study of gas-oil efficiency.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Hydrocarbon synthesis from water gas: A study of reaction mechanism and new catalysts.

United States Bureau of Standards, Washington, D. C.
Standards for gas service - the best practice, and the requirements made by municipal and state regulatory bodies in the manufacture, distribution, metering, and utilization of fuel gases, by public utilities.

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United States Geological Survey (in cooperation with the American Petroleum Institute), Washington, D. C.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

Utilities Research Commission (Inc.) (in cooperation with Purdue University), Room 522, 72 West Adams Street, Chicago, Ill.
Determination of proper welding procedure for welding with manufactured (city) gas.

University of Washington, Department of Chemical Engineering, Seattle, Wash.
Hydrogenation of coal.

Yale University, Department of Chemical Engineering, Sterling Chemistry Laboratory, 225 Prospect Street, New Haven, Conn.
Catalytic high-pressure gas reactions of the sort now being applied in the commercial production of ammonia and of methanol and in the manufacture of motor fuel from coal.
Complete gasification of coal.

K. Economics and Miscellaneous

American Gas Association (in cooperation with Johns Hopkins University), 420 Lexington Avenue, New York, N. Y.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Relative costs and application of coal, petroleum, and natural gas as fuels.

Anthracite Institute (in cooperation with Lehigh University), Primos, Delaware County, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

Anthracite Institute (in cooperation with Pennsylvania State College), 90 West Street, New York, N. Y.
Nonfuel utilization of Pennsylvania anthracite.

University of Arkansas, Fayetteville, Ark.
Comparative costs of coal and natural gas for domestic heating.

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Automatic Electric (Inc.), 1023 West Van Buren Street, Chicago, Ill.
Treatment of coal for transmitter purposes.

Burgess Battery Co., Madison, Wis.
The use of natural graphite in dry cells.

French Battery Co., 2317 Winnebago Street, Madison, Wis.
Graphite utilization in dry-cell manufacture.

Johns Hopkins University (in cooperation with the American Gas Association), Baltimore, Md.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

Kansas Engineering Society, Wichita, Kans.
Oil versus gas for domestic heating.

Lehigh University (in cooperation with the Anthracite Institute), Bethlehem, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

University of Michigan, Gas Engineering Department, Ann Arbor, Mich.
Utilization of bituminous coal in the manufacture of water gas.

Missouri School of Mines and Metallurgy, Department of Mining, Rolla, Mo.
Replacement of other fuels by natural gas.

National Carbon Co. (Inc.), Cleveland, Ohio.
Production of carbon electrodes from coke and anthracite.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Properties of coal and coke in relation to their use as reducing agents in the manufacture of zinc.

University of North Carolina, Chapel Hill, N. C.
Utilization of the "black band" associated with North Carolina coals.

Ohio State University, Engineering Experiment Station (in cooperation with the Bureau of Business Research), Columbus, Ohio.
Study of domestic coal distribution.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Economic survey of mining industry in Pennsylvania.

Pennsylvania State College, School of Mineral Industries (in cooperation with the Anthracite Institute), State College, Pa.
Nonfuel utilization of Pennsylvania anthracite.

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Purdue University, Engineering Experiment Station (in cooperation with the Indiana Gas Association), Lafayette, Ind.
Comparative heating value of gas, oil, coal, and coke in house heating.

Speer Carbon Co., St. Marys, Pa.
Use of various types of natural and artificial graphite.

United States Bureau of Mines, Southern Experiment Station, Tuscaloosa, Ala.
Beneficiation of Alabama graphite ores.

United States Geological Survey, Washington, D. C.
Quantity of coal available and the economic features of all deposits.

United States Trust Co. of New York, 45 Wall Street, New York, N. Y.
Effect on coal consumption of greater use of natural gas.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
Comparative costs of oil and coal heating in a residence.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
The economics of coal carbonization.
The statistical and competitive position of ammonia and coal tar and the products derived therefrom.

Yale University, Department of Mechanical Engineering, Sheffield Scientific School, Mason Laboratory, 400 Temple St., New Haven, Conn.
Economic studies of the use of pulverized coal in marine steam boilers.

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B. PETROLEUM, NATURAL GAS, and ASPHALT

I. Origin, Geology, and Prospecting

American Petroleum Institute (in cooperation with the National Research Council and the University of Illinois), 250 Park Avenue, New York, N. Y.
Limestones and dolomites as reservoir rocks.

American Petroleum Institute (in cooperation with the National Research Council, the Oklahoma Geological Survey, the University of California, and the University of Texas), 250 Park Avenue, New York, N. Y.
The determination of geothermal gradients in oil fields on anticlinal structures.

American Petroleum Institute (in cooperation with the National Research Council and Princeton University), 250 Park Avenue, New York, N. Y.
Origin and environment of source sediments.

American Petroleum Institute (in cooperation with the National Research Council and the United States Geological Survey), 250 Park Avenue, New York, N. Y.
Studies of source rocks in the microfurnace.

American Petroleum Institute (in cooperation with the National Research Council and the University of Wisconsin), 250 Park Avenue, New York, N. Y.
Generation of oil in rocks by shearing pressures.

University of California (in cooperation with the American Petroleum Institute, the National Research Council, the Oklahoma Geological Survey, and the University of Texas), Berkeley, Calif.
The determination of geothermal gradients in oil fields on anticlinal structures.

Carnegie Institute of Technology, Department of Geology, Schenley Park, Pittsburgh, Pa.
Oil and gas sands of the Northern Appalachian region.

Equitable Gas Co., 435 Sixth Avenue, Pittsburgh, Pa.
General problems relating to the location of wells to tap the producing sands for natural gas or oil.

Gypsy Oil Co. and Gulf Pipe Line Co. of Oklahoma, Box 2044, Tulsa, Okla.
Methods and equipment used in searching for petroleum and natural gas.

The Helium Co., Shelby Street and Goss Avenue, Louisville, Ky.
Survey of natural gas for occurrence of helium.

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Humble Oil and Refining Co., Houston, Tex.
Geophysical exploration for oil and gas deposits by gravimetric and seismic methods.
Identification and correlation of well samples.

University of Illinois (in cooperation with the American Petroleum Institute and the National Research Council), Urbana, Ill.
Limestones and dolomites as reservoir rocks.

State Conservation Department, Division of Geology, Indianapolis, Ind.
Source materials of Indiana petroleum.

Kansas Geological Survey, Lawrence, Kans.
Surface and subsurface stratigraphy of Kansas.
Origin of structures in western Kansas.

University of Kentucky, Department of Physics, Lexington, Ky.
A method for surveying deep boreholes.

Louisiana State University and Agricultural and Mechanical College, School of Geology, Baton Rouge, La.
Micropaleontological study of Gulf Coast sedimentary rocks.
Sedimentational history of Gulf Coast region.

Montana School of Mines, State Bureau of Mines and Geology, Butte, Mont.
Natural-gas resources of Montana.

National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute, the University of California, the Oklahoma Geological Survey, and the University of Texas), Washington, D. C.
The determination of geothermal gradients in oil fields on anticlinal structures.

National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute and the University of Illinois), Washington, D. C.
Limestones and dolomites as reservoir rocks.

National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute and Princeton University), Washington D. C.
Origin and environment of source sediments.

National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute and the United States Geological Survey), Washington D. C.
Studies of source rocks in the microfurnace.

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National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute and the University of Wisconsin), Washington, D. C.
Generation of oil in rocks by shearing pressures.

National Research Council, Division of Geology and Geography (in cooperation with Pennsylvania State College), Washington, D. C.
Petrographic studies of Pennsylvania oil sands.
Paleontology of the cap rocks of the Bradford sand.

The Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Oil-bearing shales of Ohio.

Oklahoma Geological Survey (in cooperation with the American Petroleum Institute, the University of California, the National Research Council, and the University of Texas), Norman, Okla.
The determination of geothermal gradients in oil fields on anticlinal structures.

State of Oklahoma (in cooperation with the United States Bureau of Mines), Oklahoma City, Okla.
Engineering study of the Oklahoma City field.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Continuity of sandstone beds and shale breaks in the Bradford oil sands.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas Engineering, State College, Pa.
Studies in sedimentation of Pennsylvania oil and gas sands.

Pennsylvania State College, School of Mineral Industries (in cooperation with the National Research Council), State College, Pa.
Petrographic studies of Pennsylvania oil sands.
Palentology of the cap rocks of the Bradford sand.

Princeton University (in cooperation with the American Petroleum Institute and the National Research Council), Princeton, N. J.
Origin and environment of source sediments.

Standard Oil Co. of California, 225 Bush Street, San Francisco, Calif.
Search for oil.

Stanford University, Stanford University, Calif.
The origin of petroleum from diatoms.

South Dakota Geological Survey, University of South Dakota, Vermillion, S.Dak.
Location of structure and stratigraphic studies.

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Southwest Gas Utilities Corporation, Box 478, Ada, Okla.
Attempt to further correlate geological data as especially applicable to natural-gas prospecting.

Texas Technological College, Department of Geology, Lubbock, Tex.
Geological problems connected with West Texas development.

University of Texas (in cooperation with the American Petroleum Institute, the University of California, the National Research Council, and the Oklahoma geological Survey), Austin, Tex.
The determination of geothermal gradients in oil fields on anticlinal structures.

The Trees Oil Co., Winfield, Kans.
Geophysical investigation of oil-bearing formations.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the State of Oklahoma), Bartlesville, Okla., and Petroleum Field Office, Dallas, Tex.
Engineering study of the Oklahoma City field.

United States Bureau of Mines, Petroleum Field Office, Dallas, Tex.
Engineering study of the Roberts-Settles Pool, Texas.
Engineering study of West Texas fields.
Engineering study of Zwolle field, Louisiana.

United States Geological Survey, Washington, D. C.
Geologic relations, areal distribution, character, origin, quantity available, and to a certain extent the economic features of deposits of petroleum, oil shale, and bituminous rock, natural gas, and asphalt.
Physical and chemical factors in the accumulation and discharge of petroleum, such as proportion of voids, pore size and shape, pore wall nature of petroleum (fluidity, gas content), purging fluids effective and available for weakening adsorption, permeability for water and oil production and control of open bonds.
Correlation of temperature with geologic structure in the oil fields.

United States Geological Survey (in cooperation with the American Petroleum Institute and the National Research Council), Washington, D. C.
Studies of source rocks in the microfurnace.

Vanderbilt University, Department of Geology, Nashville, Tenn.
Oil and gas distribution in Tennessee and Kentucky.
Gas in northern Alabama.

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Venezuelan Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa.
Seismic-wave investigations in connection with geophysical prospecting for petroleum.

University of Wisconsin (in cooperation with the American Petroleum Institute and the National Research Council), Madison, Wis.
Generation of oil in rocks by shearing pressures.

II. Properties and Tests: Motor Fuels and Lubricants

American Petroleum Institute (in cooperation with the National Automobile Chamber of Commerce, the Society of Automotive Engineers, and the United States Bureau of Standards), 250 Park Avenue, New York, N. Y.
Gasoline in its relation to automotive engine performance.

American Photoelectric Corporation, 215 Third Avenue, New York, N. Y.
Evaluation of lubricating oils through accelerated aging and accurate spectrophotometric analysis in both ultra-violet and visible spectrum with A. P. C. photo-electric spectrophotometers.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials, the American Standards Association, the Society of Automotive Engineers, various professional and manufacturing associations and industrial, governmental and university laboratories), 29 West 39th Street, New York, N. Y.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers, the American Standards Association, the Society of Automotive Engineers, various professional and manufacturing associations and industrial, governmental and university laboratories), 1315 Spruce Street, Philadelphia, Pa.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

American Standards Association (in cooperation with the American Society of Mechanical Engineers, the American Society for Testing Materials, the Society of Automotive Engineers, various professional and manufacturing associations and industrial, governmental and university laboratories), 29 West 39th Street, New York, N. Y.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

The Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa.
Optimum properties for motor fuel and lubricants.
Standardization of test for detonating tendency of motor fuel.

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Atlantic Refining Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), 260 South Broad Street, Philadelphia, Pa.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

Cadillac Motor Car Co., 2860 Clark Avenue, Detroit, Mich.
Methods of testing lubricants for serviceability.

Combustion Utilities Corporation, 60 Wall Street, New York, N. Y.
Gum-forming compounds in gasoline.

The De Laval Separator Co., Poughkeepsie, N. Y.
Apparatus for measurement of tendency of lubricating oils to form sludge and emulsion.
Service characteristics of Diesel engine lubricating oil.

Detroit Edison Co., Detroit, Mich.
Correlation of laboratory and service tests data on turbine oils.

Electric Boat Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), 11 Pine Street, New York, N. Y.
Characteristics of a satisfactory Diesel-engine fuel oil.

Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y.
Antiknock values in motor fuels.

Fairbanks, Morse & Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), 900 South Wabash Street, Chicago, Ill.
Characteristics of a satisfactory Diesel-engine fuel oil.

Hill Diesel Engine Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), Lansing, Mich.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

Humble Oil & Refining Co., Houston, Tex.
The chemical and physical properties of lubricating oil distillates from different crude sources, with a view to the elimination of undesirable constituents and the improvement of engine performance of the motor oils which may be made from such distillates.
The influence of light hydrocarbons, e.g., propane, isobutane and normal butane, on the quality of gasoline with which they may be blended, with especial reference to vapor pressure, gas-locking tendency and distillation characteristics.

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Hupp Motor Car Corporation, Detroit, Mich.
Relative merits of lubricating oils made from different types of crude, especially in regard to the formation of acids and sludge.

Ingersoll-Rand Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), 11 Broadway, New York, N. Y.
Characteristics of a satisfactory Diesel engine fuel oil.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
Tests of lubricating oils to determine qualities, or tests which indicate service value.

State University of Iowa (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), Iowa City, Ia.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

Linfield College, McMinnville, Oreg.
The relation of surface tension to lubrication.

Massachusetts Institute of Technology (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), Cambridge, Mass.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
The volatility of motor fuels.

Montana State School of Mines, State Bureau Mines and Geology, Butte, Mont.
Sulphur content of Montana gasoline.

National Automobile Chamber of Commerce (in cooperation with the American Petroleum Institute, the Society of Automotive Engineers and the United States Bureau of Standards), 366 Madison Avenue, New York, N. Y.
Gasoline in its relation to automotive-engine performance.

Natural Gasoline Association of America, 305 Tulsa Building, Tulsa, Okla.
Analysis and fuel-line temperatures of present commercial and synthetic fuels under all conditions of actual flying.
Evaluation of varying compositions of natural gasoline.
A study of volatility and its relation to engine starting, acceleration, power, vapor lock, and performance.

The Ohio Grease Co., Loudonville, Ohio.
Testing oils to determine suitability for use as lubricants.

University of Oklahoma, Norman, Okla.
Antiknock qualities of gasoline.

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Pennsylvania State College, School of Mineral Industries, State College, Pa.
Tests for determining effect of low temperatures on lubricants in the presence of refrigerants.

Public Service Electric & Gas Co., Newark, N. J.
Accelerated aging tests of turbine lubricating oil.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Characteristics of motor fuels.
Characteristics of lubricating oils.

Society of Automotive Engineers (in cooperation with the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Standards Association, various professional and manufacturing associations, and industrial, governmental and university laboratories), 29 West 39th Street, New York, N. Y.
Study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

Society of Automotive Engineers (in cooperation with the American Petroleum Institute, the National Automobile Chamber of Commerce and the United States Bureau of Standards), 29 West 39th Street, New York, N. Y.
Gasoline in its relation to automotive-engine performance.

L. Sonneborn Sons (Inc.), 114 Fifth Avenue, New York, N. Y.
Depression of pour test of lubricants by means of protective colloids.

Special Research Committee on Diesel Fuel Oil Specifications (the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Standards Association, and the Society of Automotive Engineers), 29 West 39th Street, New York, N. Y.
A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

Standard Oil Co. of New Jersey (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), New York, N. Y.
Physical tests of oil used as Diesel-engine fuel.

Standard Oil Co. of New York, General Laboratories, 412 Greenpoint Avenue, Brooklyn, N. Y.
Fluidity and plasticity of lubricants at low temperatures.

The Texas Co. (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), New York, N. Y.
Physical tests of oil used as Diesel-engine fuel.

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United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Oklahoma.

Periodical surveys of properties of commercial motor fuels.
Methods for determining sulphur content of commercial motor fuels.
Periodic surveys of sulphur content of commercial motor fuels.
Study of gum content of commercial motor fuels.
Effect of fractionation on the properties of motor fuels.
Methods for treatment for removal of deleterious substances from motor fuels.

United States Bureau of Standards, Washington, D. C.

Antiknock values of motor gasolines.
Survey of methods of measuring antiknock characteristics of fuels.
Economic volatility of motor fuels.
Methods of determination of sulphur in volatile fuels.
The characteristics of commercial oils for internal-combustion engines.
Methods of determining acidity in lubricating oils.
Oxidation test for internal combustion engine oils.
Standardization of hardness of grease.
Study of the characteristics of gear-transmission lubricants.

United States Bureau of Standards (in cooperation with the Society of Automotive Engineers, the American Petroleum Institute and the National Automobile Chamber of Commerce), Washington, D. C.

Gasoline in its relation to automotive-engine performance.

United States Bureau of Standards (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), Washington, D. C.

A study of properties of Diesel fuels and the development of Diesel fuel oil specifications.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.

Evaluation of lubricating oils by work factor method.
Developing an accelerated test for gum formation in aviation gasoline when stored.
Development of a method for determining antiknock values of aviation gasolines and the establishment of a standard antiknock requirement for aviation gasolines.

United States Naval Academy, Engineering Experiment Station (in cooperation with the Special Research Committee on Diesel Fuel Oil Specifications), Annapolis, Md.

Characteristics of a satisfactory Diesel-engine fuel oil.

Vacuum Oil Co., 61 Broadway, New York, N. Y.

Fundamental research on petroleum hydrocarbons.

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State College of Washington, Department of Physics, Pullman, Wash.
The relation between the lubrication quality of typical lubricating oils and their other physical characteristics.

White Eagle Oil Corporation, 1400 Federal Reserve Bank Building, Kansas City, Mo.
Automotive properties of refined oils.

Yale University, New Haven, Conn.
Comparative tests of lubricants for a rotary ammonia compressor.

Yale University, Department of Electrical Engineering, New Haven, Conn.
Dielectric properties of paraffin and other waxes.

III. Properties and Tests: Miscellaneous

American Gas Association Testing Laboratory, Cleveland, Ohio.
Characteristics of mixed gases.

American Petroleum Institute (in cooperation with the California Institute of Technology), 250 Park Avenue, New York, N. Y.
Determination of solubility of hydrocarbon gases in liquid hydrocarbons, the rate of solution, and the change in viscosity resulting from such solution.

American Petroleum Institute (in cooperation with Johns Hopkins University), 250 Park Avenue, New York, N. Y.
The reactions of a number of selected organic sulphur compounds.

American Petroleum Institute (in cooperation with Massachusetts Institute of Technology), 250 Park Avenue, New York, N. Y.
A study of the relative rates of reaction of the olefins.

American Petroleum Institute (in cooperation with the University of Minnesota) 250 Park Avenue, New York, N. Y.
The effect of electrical discharge upon gaseous hydrocarbons.

American Petroleum Institute (in cooperation with the National Research Council, and the United States Bureau of Standards), 250 Park Avenue, New York, N. Y.
The separation, identification, and determination of the chemical constituents of commercial petroleum fractions.

American Petroleum Institute (in cooperation with the University of North Carolina), 250 Park Avenue, New York, N. Y.
The preparation and properties of thiophanes.

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American Petroleum Institute (in cooperation with Stanford University), 250 Park Avenue, New York, N. Y.
The heat capacities and free energies of some typical hydrocarbon compounds.

American Petroleum Institute (in cooperation with the University of Texas), 250 Park Avenue, New York, N. Y.
Isolation and investigation of nitrogen compounds present in petroleum.

American Petroleum Institute (in cooperation with the United States Bureau of Standards), 250 Park Avenue, New York, N. Y.
Thermodynamic properties of petroleum hydrocarbons.

American Petroleum Institute (in cooperation with the United States Geological Survey), 250 Park Avenue, New York, N. Y.
The determination of the thermal conductivity of gases and its application to the precise analysis of hydrocarbons and other gases.

The American Society of Mechanical Engineers (in cooperation with the United States Bureau of Standards), 29 West 39th Street, New York, N. Y.
Viscosity of petroleum at high temperature.
The phenomena of oiliness.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards and the Asphalt Shingle and Roofing Institute), 1315 Spruce Street, Philadelphia, Pa.
Standardization of accelerated weathering tests of bituminous roofing materials.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Power factor and resistivity of insulating oils.

American Society for Testing Materials (in cooperation with six industrial laboratories), 1315 Spruce Street, Philadelphia, Pa.
Refined ductility tests for bituminous roofing materials.

American Society for Testing Materials (in cooperation with industrial laboratories), 1315 Spruce Street, Philadelphia, Pa.
Method of separation of cut-back asphalt.

American Tar Products Co. (in cooperation with the American Society for Testing Materials), Union Trust Building, Pittsburgh, Pa.
Refined ductility tests for bituminous roofing materials.

Anderson Prichard Oil Corporation, Oklahoma City, Okla; Laboratories, Chicago, Ill.
Comparison of methods of measuring the gum-solvent power of naphtha.

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Arizona State Highway Department (in cooperation with the Union Oil Co. of California and the California Highway Commission), Phoenix, Ariz.
Asphaltic residue determinations with modified Brown evaporator head.

Asphalt Shingle and Roofing Institute (in cooperation with the American Society for Testing Materials and the United States Bureau of Standards), 2 West 45th Street, New York, N. Y.
Standardization of accelerated weathering tests of bituminous roofing materials.

Atchison, Topeka & Santa Fe Railway Co., Test Department, Crane and Branner Streets, Topeka, Kans.
Specification for suitable fuel oils for locomotive and power plants and tests of same.

The Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa.
Physical data on petroleum fractions.
Solid hydrocarbons in petroleum.

The Barber Asphalt Co., Technical Bureau, Maurer, N. J.
Determination of physical and chemical properties of asphalt.

The Barber Asphalt Co., Technical Bureau (in cooperation with the American Society for Testing Materials), Maurer, N. J.
Refined ductility tests for bituminous roofing materials.

The Barrett Co. (in cooperation with the American Society for Testing Materials), 40 Rector, New York, N. Y.
Refined ductility tests for bituminous roofing materials.

Bird and Son (in cooperation with the American Society for Testing Materials), Mill Street, East Walpole, Mass.
Refined ductility tests for bituminous roofing materials.

California Highway Commission (in cooperation with the Arizona State Highway Department and the Union Oil Co. of California), Sacramento, Calif.
Asphaltic residue determinations with modified Brown evaporator head.

California Highway Commission (in cooperation with the United States Bureau of Public Roads), Sacramento, Calif.
Determination of general suitability of cut-back asphalt for road purposes.

California Institute of Technology (in cooperation with the American Petroleum Institute), Pasadena, Calif.
Determination of solubility of hydrocarbon gases in liquid hydrocarbons, the rate of solution, and the change in viscosity resulting from such solution.

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University of California, Department of Mechanical Engineering, Berkeley, Calif.
Thermal conductivity of petroleum products.

University of California, Department of Mining and Metallurgy, Berkeley, Calif.
The viscosities of gas-oil froths.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
Physical and chemical properties including inflammability and toxicity of a number of halogen derivatives of the hydrocarbons, especially dichlorethylene, trichlorethylene, tetrachlorethylene (the last two primarily as vapor solvents), dichloromethane, pentachlorethane, and orthodichlorbenzine.

The Chemical Service Laboratories (Inc.), 18th and Cherry Streets, Philadelphia, Pa.
Laboratory evaluation of oils used to carburet blue water gas.

Colorado School of Mines, Petroleum Engineering Department, Golden, Colo.
Investigation of gums formed in petroleum products.

University of Colorado, Boulder, Colo.
Rate of solution and solubility at various temperatures and pressure of gases in crude oil.

Commonwealth Edison Co., 72 West Adams Street, Chicago, Ill.
Sludging qualities of transformer oils.

Cornell University, Ithaca, N. Y.
Electron bombardment of hydrocarbons.

Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Effect of cathode-ray bombardment on cable compounds and hydrocarbon oils.

Dow and Smith (in cooperation with the American Society for Testing Materials), 131 East 23rd Street, New York, N. Y.
Refined ductility tests for bituminous roofing materials.

Flintkote Co. (in cooperation with the American Society for Testing Materials) 31 St. James Avenue, Boston, Mass.
Refined ductility tests for bituminous roofing materials.

Humble Oil & Refining Co., Houston, Tex.
Fundamental study of the reactions involved in the removal of sulphur compounds and other undesirable constituents of crude distillates, with a view to the improvement of product quality.

Humble Oil & Refining Co., Production Research Division of Development Department, Houston, Tex.
Changes in physical properties of oil and gas with age of field.

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Jackson Engineering Corporation, 11 East 5th Avenue, Tulsa, Okla.
Effect of high total pressure (400-800 pounds per square inch) upon the solubility of natural-gas constituents in absorption oil.

Johns Hopkins University (in cooperation with the American Petroleum Institute), Baltimore, Md.
The reactions of a number of selected organic sulphur compounds.

LaMotte Chemical Products Co., McCormick Building, Baltimore, Md.
Determining of pH of oil emulsions.

Massachusetts Institute of Technology (in cooperation with the American Petroleum Institute), Cambridge, Mass.
A study of the relative rates of reaction of the olefins.

Massachusetts Institute of Technology, Research Laboratory of Applied Chemistry, Cambridge, Mass.
Equilibrium vapor-liquid compositions for binary hydrocarbon mixtures in the neighborhood of critical temperature.
Heat content of liquid and gaseous hydrocarbons in the neighborhood of their critical temperatures.

Michigan State Highway Laboratory, Ann Arbor, Mich.
Correlation of routine laboratory tests of asphalts with devised physical tests to determine the characteristics of the most suitable materials for waterproofing bridge concrete.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
The vapor-pressure of hydrocarbons.

University of Minnesota, School of Chemistry (in cooperation with the American Petroleum Institute), Minneapolis, Minn.
The chemical effect of electrical discharge upon gaseous hydrocarbons.

Mississippi College, Chemistry Department, Clinton, Miss.
Quantitative determination of type-sulphur compounds present in petroleum and in petroleum distillates.

National Research Council, Division of Geology and Geography (in cooperation with the American Petroleum Institute and the United States Bureau of Standards), Washington, D. C.
The separation, identification, and determination of the chemical constituents of commercial petroleum fractions.

University of North Carolina (in cooperation with the American Petroleum Institute), Chapel Hill, N. C.
The preparation and properties of thiophanes.

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Ohio State Highway Department, Testing Laboratory, Engineering Experiment Station, Ohio State University, Columbus, Ohio.
Determination of whether asphalts from different sources having approximately the same penetration of 25° C. will vary appreciably in consistency at higher temperatures.
Density of sheet asphalt mixtures.

University of Oklahoma, Norman, Okla.
Oklahoma asphalts.
Paraffin wax.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas Engineering, State College, Pa.
Physical and chemical properties of crude oils recovered by different methods of operation and of the residual oil left in the sand.
Effect of physical properties of oil and orifice dimension on spray formation.
Viscosity of crude oil under varying conditions.

Walter J. Podbielniak, Research Chemical Engineer, 1208 Medical Arts Building, Tulsa, Okla.
Development of precise fractional distillation and other methods for separation of natural gas, gasolines, and petroleum into the individual hydrocarbons (or very close cut fractions) present.
Physicochemical theory of complex mixtures with practical applications to chemical engineering in the petroleum industries.

Rice Institute, Department of Physics, Houston, Tex.
Thermodynamical theory of cracking petroleum.

Robertshaw Thermostat Co., Youngwood, Pa.
Physical characteristics of heating gases.
Physical characteristics of gaseous filled thermostatic bellows.

Rutgers University, Department of Physics, New Brunswick, N. J.
Surface tension of oils at high temperatures.

Sinclair Refining Co., Development Department, East Chicago, Ind.
Crystalline and amorphous petroleum waxes.

L. Sonneborn Sons (Inc.), 114 Fifth Avenue, New York, N. Y.
Constitution, properties, and application of sulphonated hydrocarbons.

University of Southern California, Los Angeles, Calif.
The effect of radioactivity on oils.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Properties of petroleum and its constituents.

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Standard Oil Co. of New Jersey and its Subsidiaries, 26 Broadway, New York, N.Y.
Chemistry of petroleum.

Stanford University, Stanford University, Calif.
Free energies and specific heats of petroleum.

Stanford University (in cooperation with the American Petroleum Institute), Stanford University, Calif.
The heat capacities and free energies of some typical hydrocarbon compounds.

Sun Oil Co., 1608 Walnut Street, Philadelphia, Pa.
The determination of the critical temperatures and the critical pressures of petroleum hydrocarbons.
The determination of the cracking temperatures of various hydrocarbons under different pressures.

Syracuse University, Department of Chemical Engineering, Syracuse, N. Y.
Unsaturated compounds in petroleum.
Sulphur in petroleum.

University of Texas (in cooperation with the American Petroleum Institute), Austin, Tex.
Isolation and investigation of nitrogen compounds present in petroleum.

Tide Water Oil Co., East 22nd Street, Bayonne, N. J.
Study of crude-oil characteristics.

Union Oil Co. of California (in cooperation with the Arizona State Highway Department and the California Highway Commission), Los Angeles, Calif.
Asphaltic residue determinations with modified Brown evaporator head.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Study of crude petroleum.
Investigation of sulphur compounds in crude oil.
A study of solubility of natural gas in various crude oils.
Investigation of the effect on crude petroleum of air used in repressuring oil fields.

United States Bureau of Mines, Petroleum Field Office, Boulder, Colo.
Distribution of nitrogen and sulphur in oil shale.
Study of nitrogen compounds in oil shale and shale oil.

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United States Bureau of Mines, Petroleum Field Office, Laramie, Wyo.
Laboratory study of physical characteristics of paraffins and waxes.
Study of solubility of paraffin in solvents from crude oil with and without natural gas in solution.
Chemical study of the pure wax fractions separated from rod wax or paraffin occurring and precipitated in crude oils.
Study of the physical and chemical properties of the black oils of the Rocky Mountains.
Thermodecomposition of Rocky Mountain high-sulphur crudes (black oils).

United States Bureau of Public Roads, Washington, D. C.
Development of suitable laboratory tests for bituminous mixtures.
Development and standardization of specifications and tests for bituminous materials.

United States Bureau of Public Roads (in cooperation with the California Highway Commission), Washington, D. C.
Determination of general suitability of cut-back asphalt for road purposes.

United States Bureau of Standards, Washington, D. C.
Pressure-volume-temperature of crude oil-natural gas mixtures.
Development of test methods for testing petroleum products.
Methods for fractionating petroleum into its constituent hydrocarbons.
Fluidity of oils at low temperatures.
Thermodynamic properties of petroleum oils.
Thermal properties of petroleum and petroleum products.

United States Bureau of Standards (in cooperation with the American Petroleum Institute), Washington, D. C.
Thermodynamic properties of petroleum hydrocarbons.

United States Bureau of Standards (in cooperation with the American Petroleum Institute and the National Research Council), Washington, D. C.
The separation, identification and determination of the chemical constituents of commercial petroleum fractions.

United States Bureau of Standards (in cooperation with the American Society of Mechanical Engineers), Washington, D. C.
Viscosity of petroleum at high temperature.
The phenomena of oiliness.

United States Bureau of Standards (in cooperation with the American Society of Testing Materials), Washington, D. C.
Power factor and resistivity of insulating oils.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials and the Asphalt Shingle and Roofing Institute), Washington, D. C.
Standardization of accelerated weathering tests of bituminous roofing materials.

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United States Geological Survey (in cooperation with the American Petroleum Institute), Washington, D. C.
The determination of the thermal conductivity of gases and its application to the precise analysis of hydrocarbons and other gases.

Vacuum Oil Co., 61 Broadway, New York, N. Y.
Fundamental research on petroleum hydrocarbons.

Washington State Highway Department, Olympia, Wash.
Stability studies of bituminous mixtures.

Yale University, Department of Electrical Engineering, New Haven, Conn.
Dielectric properties of paraffin and other waxes.

IV. Development and Production

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Treatment of oil-well sludges.

American Gas Association, Natural Gas Department (in cooperation with the United States Bureau of Mines), 420 Lexington Avenue, New York, N. Y.
Study of the flow of natural gas through pipe lines.
Study of methods for gaging and controlling natural gas wells.

American Petroleum Institute (in cooperation with California Institute of Technology), 250 Park Avenue, New York, N. Y.
The fundamentals of the retention of oil by sand.
Determination of solubility of hydrocarbon gases in liquid hydrocarbons, the rate of solution, and the change in viscosity resulting from such solution.

American Society of Mechanical Engineers (in cooperation with the University of Oklahoma), 29 West 39th Street, New York, N. Y.
The efficiencies of all equipment used in drilling a rotary-drilled oil well.

Atlantic Oil Producing Co., Magnolia Building, Dallas, Tex.
Conservation of gas to prolong flowing life of oil wells.

The Barber Asphalt Co., Technical Bureau, Maurer, N. J.
Mining of natural asphalts.

California Institute of Technology, Pasadena, Calif.
Dehydration of oil emulsions.

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California Institute of Technology (in cooperation with the American Petroleum Institute), Pasadena, Calif.
Determination of solubility of hydrocarbon gases in liquid hydrocarbons, the rate of solution, and the change in viscosity resulting from such solution.
The fundamentals of the retention of oil by sand.

University of California, Department of Electrical Engineering, Berkeley, Calif.
The high-voltage method of dehydration of petroleum.

University of California, Department of Mining and Metallurgy, Berkeley, Calif.
The viscosities of gas-oil froths.
The pressure gradient in the oil sands about a high-pressure well.
A comparative study of methods of determining porosity and permeability of oil sands.
The physical properties of mud-laden fluids used in rotary drilling.
Flow of gas-oil mixtures through vertical pipes, with particular reference to the design of tubing installations in, and pressure control of, gas-lift and flowing wells.
The effects of pressure, temperature, and dilution on the setting properties and strengths of oil-well cements.

Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.
Methods of recovery of oil by water and air pressure.
Permeability of oil sands.

University of Colorado, Boulder, Colo.
Rate of solution and solubility at various temperatures and pressures of gases in crude oil.

Cornell University, Department of Geology, Ithaca, N. Y.
Flow of oil, gas, and water through sands.

The Deister Concentrator Co., 901 Glasgow Avenue, Fort Wayne, Ind.
Conditioning of rotary-drilling mud with vibrating screens.

The De Laval Separator Co., Poughkeepsie, N. Y.
Centrifugal separation of crude oil from water and emulsion.

The Dorr Co. (Inc.), 247 Park Avenue, New York, N. Y.
Rotary-drill mud.

Falk and Co., Carnegie, Pa.
Demulsibility or demulsion of emulsions.

Freeport Sulphur Co., Freeport, Tex.
Treatment of mud-laded fluid for drilling wells.

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Ginter Chemical Laboratory, 110 West Cameron Street, Tulsa, Okla.
Nonferrous heavies for rotary muds.

Gulf Production Co., 1907 Gulf Building, Houston, Tex.
Study of drilling technique to increase drilling speed, improve the quality of hole, prevent loss of holes, and eliminate troubles incident to drilling through high pressure gas zones.

Gypsy Oil Co. and Gulf Pipe Line Co. of Oklahoma, Box 2044, Tulsa, Okla.
Methods and equipment used in producing petroleum and natural gas.
The treating of oil-field emulsions.

Humble Oil & Refining Co., Production Research Division of the Development Department, Houston, Tex.
Study of oil sand drainage and effect on well spacing.
Study and development of production methods for maximum conservation of gas energy and most efficient utilization of gas released with oil.
Chemical problems connected with drilling, especially cement and rotary mud.

Humble Oil & Refining Co., Houston, Tex.
Mud-laden fluids for oil-well drilling.
Oil recovery.

University of Kansas, Department of Mining Engineering, Lawrence, Kans.
Relations of oil and gas under high pressures.

University of Kentucky, Department of Mines and Metallurgy, Lexington, Ky.
The low-temperature distillation of oil shale.

La Motte Chemical Products Co., McCormick Building, Baltimore, Md.
Stabilizing oil emulsions.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Petroleum production fellowship.

The National Refining Co., 1404 East 9th Street, Cleveland, Ohio.
Increased recovery of petroleum from oil sands.

National Research Council, Division of Geology and Geography (in cooperation with Pennsylvania State College), B and 21st Streets, Washington, D. C.
Interfacial tensions relations between sand, water, and oil.
Porosity-permeability relations of Pennsylvania oil sands.

State of Oklahoma (in cooperation with the United States Bureau of Mines), Oklahoma City, Okla.
Disposal of oil-field waters.

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University of Oklahoma, Norman, Okla.
Effect of natural gas in recovery of oil.
Mud fluids used in oil wells.
Sucker-rod trouble as encountered in oil wells.

University of Oklahoma, Department of Physics, Norman, Okla.
The flow of a gas-free oil through a spherical-grain sand.
The flow of a gas-saturated liquid through a capillary tube.
The nature of the resistance to flow offered by a (cylindrical) gas bubble in a liquid-filled capillary tube.

University of Oklahoma, School of Mechanical Engineering, Norman, Okla.
Air-gas lift as applied to the flowing of oil wells.

University of Oklahoma, School of Mechanical Engineering (in cooperation with the American Society of Mechanical Engineers), Norman, Okla.
The efficiencies of all equipment used in drilling a rotary-drilled oil well.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum, and Natural Gas Engineering, State College, Pa.
Oil production data for individual properties.
Study of water in oil sands.
Oil recovery from sandstone cores.
Solution viscosity changes in Pennsylvania crude oil when repressured with air or gas.
Relative oil recovery from cores of different characteristics when repressuring or flooding conditions are the same.
Does water or sodium carbonate solution remove the oil film from sandstone?
The plugging effect of sodium carbonate solution and calcium chloride solution in contact in the pores of sandstones.
Pressure drop in oil sands.
Effect of water in driving oil out of cores when core drilling.
The mechanics of fluid flow in oil sands.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas Engineering (in cooperation with the National Research Council), State College, Pa.
Interfacial tension relations between sand, water, and oil.
Porosity-permeability relations of Pennsylvania oil sands.

Petroleum Rectifying Co. of California, 530 West Sixth Street, Los Angeles, Calif.
Dehydration of petroleum emulsions by electrical process.
Applicability of electrical fields to removal of suspended and colloidal solids from petroleum.

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Pure Oil Co., 35 East Wacker Drive, Chicago, Ill.
Dehydration of crude oil emulsions.

The Reed Roller Bit Co., Box 1863, Houston, Tex.
Investigation of special drilling methods.

St. Bonaventure's College, Department of Chemistry, St. Bonaventure, N. Y.
The determination of desirable properties of water for flooding purposes.

Standard Oil Co. of California, 225 Bush Street, San Francisco, Calif.
Production methods.

Texas Pacific Coal & Oil Co., Thurber, Tex.
Repressuring in Ranger deep production.

The Trees Oil Co., Winfield, Kans.
Analysis of oil field waters, conducted for purpose of top and bottom hole shut-off.

Union Oil Co. of California, 1108 Union Oil Building, Los Angeles, Calif.
Development and improvement of drilling and producing methods looking toward more economical and efficient means of development and recovery.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla
Methods for increasing recovery of oil.
A study of solubility of natural gas in various crude oils.
Investigation of the effect on crude petroleum of air used in repressuring oil fields.
Study of the flow of crude oil through oil sand.
Investigation of pressures and temperatures in deep oil and gas wells.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the American Gas Association), Bartlesville, Okla.
Study of the flow of natural gas through pipe lines.
Study of methods for gaging and controlling natural-gas wells.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the State of Oklahoma), Bartlesville, Okla.
Disposal of oil-field waters.

United States Bureau of Mines, Petroleum Field Office, Laramie, Wyo.
Thermodynamic study of well efficiencies.

United States Bureau of Mines, Petroleum Field Office, San Francisco, Calif.
Increased oil recovery by repressuring methods.
Temporary shutting in of producing wells to conserve gas and oil underground.

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United States Bureau of Standards, Washington, D. C.
Pressure-volume-temperature of crude oil-natural gas mixtures.

United States Geological Survey, Washington, D. C.
Physical and chemical factors in the accumulation and discharge of petroleum, such as proportion of voids, pore size and shape, pore walls, nature of petroleum (fluidity, gas content), purging fluids effective and available for weakening adsorption, permeability for water and oil, production and control of open bonds.
Drilling and production methods of oil and gas.
Nature of oil-field emulsions and means of breaking them down.
Standardization of casing programs in oil and gas fields.
Control and extent of oil and gas drainage.
Repressuring of oil sands by injection of gas or air.
Identification of oil-field waters.

Western Research Corporation, 4300 Galapago Street, Denver, Colo.
Extraction of hydrocarbons from oil sands at Ft. McMurry, Alberta, Canada.

V. Transportation and Storage

American Gas Association (in cooperation with Johns Hopkins University), 420 Lexington Avenue, New York, N. Y.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

American Gas Association, Natural Gas Department (in cooperation with the United States Bureau of Mines), 420 Lexington Avenue, New York, N. Y.
Study of the flow of natural gas through pipe lines.

American Gas Association, Natural Gas Department (in cooperation with the United States Bureau of Mines and the United States Bureau of Standards), 420 Lexington Avenue, New York, N. Y.
Use of certain types of orifice meters in measurement of oil and natural gas.

American Gas Association, Testing Laboratory, Cleveland, Ohio.
Pipe-joint research.

The American Society of Mechanical Engineers, 29 West 39th Street, New York, N.Y.
Automatic pipe-line pumping stations.

The Barber Asphalt Co., Technical Bureau, Maurer, N. J.
Transportation of asphalt.

Fuller Company, Catasauqua, Pa.
Transportation and compression of natural and petroleum gases.

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Gypsy Oil Co. and Gulf Pipe Line Co. of Oklahoma, Box 2044, Tulsa, Okla.
Losses of light fractions of crude oil in storage and transportation.

Humble Oil & Refining Co., Houston, Tex.
Study of evaporation losses incidental to storage of crude petroleum in the field and during its transportation to the refineries.

Johns Hopkins University (in cooperation with the American Gas Association, Baltimore, Md.
Study of scientific and economic considerations entering into the production and distribution of certain proposed gas mixtures.

Lafayette College, Easton, Pa.
The flow of oils and gases.

Los Angeles Gas and Electric Corporation, Box 1100, Station C, Los Angeles, Calif.
Effects of natural gas on old manufactured-gas distribution system.
Rehydration of natural gas with oil and water vapors.

Metric Metal Works, Erie, Pa.
Petroleum and gas measurement.

Missouri Paint and Varnish Co., 5125 North 2nd Street, St. Louis, Mo.
Pipe-line and storage-tank coatings and cements (oil, acid and corrosion resistant).

The National Refining Co., 1404 East 9th Street, Cleveland, Ohio.
Reduction of storage losses and hazards.

University of Oklahoma, Norman, Okla.
The effect of gravity and viscosity change when measuring oil by the orifice meter method.

Rice Institute, Mechanical Engineering Department, Houston, Tex.
Friction loss across welded pipe bends.

Shell Oil Co., 100 Bush Street, San Francisco, Calif.
Transportation of products and by-products from petroleum and natural gas

Southern California Gas Co., Los Angeles, Calif.
Natural-gas measurement.

Southwest Gas Utilities Corporation, Box 478, Ada, Okla.
Storage of natural gas in old gas fields.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Evaporation losses under different storage methods.

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Standard Oil Co. (Ohio), Cleveland, Ohio.
Pipe-line versus rail transportation for gasoline for short distances and for small quantities.

Texas Pacific Coal & Oil Co., Thurber, Tex.
Storage of gasoline plant residue gas in depleted gas sands.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Study of evaporation losses of petroleum and gasoline.
Study of tank corrosion.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the American Gas Association), Bartlesville, Okla.
Study of the flow of natural gas through pipe lines.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the American Gas Association and the United States Bureau of Standards), Bartlesville, Okla.
Use of certain types of orifice meters in measurement of oil and natural gas.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.; and Petroleum Field Office, San Francisco, Calif.
Underground storage of gas.

United States Bureau of Mines, Petroleum Field Office, San Francisco, Calif.
Transportation of natural gasoline by pipe line.

United States Bureau of Standards, Washington, D. C.
Standards for gas service: The best practice, and the requirements made by municipal and state regulatory bodies in the manufacture, distribution, metering and utilization of fuel gases by public utilities.

United States Bureau of Standards (in cooperation with the American Gas Association and the United States Bureau of Mines), Washington, D. C.
Use of certain types of orifice meters in measurement of oil and natural gas.

VI. Refining

(Problems on filtering and clarifying earths are listed under C-X.)

American Petroleum Institute (in cooperation with Northwestern University), 250 Park Avenue, New York, N. Y.
Noncatalytic thermal decomposition of pure hydrocarbons and related compounds.

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American Petroleum Institute (in cooperation with Princeton University), 250 Park Avenue, New York, N. Y.
Specific adsorbents for sulphur compounds in petroleum.

Arab Gasoline Corporation, Box 997, Eastland, Tex.
Effects of plant conditions on recovery of natural gasoline from natural gas.
Chemical methods of processing natural gas to increase the yield of natural gasoline obtained therefrom.

American Sheet and Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Removal of slight traces of oxygen from natural gas.

The Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa.
Improvement of refining methods.
Removal of sulphur from oils.

The Barber Asphalt Co., Technical Bureau, Maurer, N. J.
Improvements in refining methods of asphaltic oils.
Development of road oils.

Bijur Lubricating Corporation, 22-08 43rd Avenue, Long Island City, N. Y.
Obtaining oil with the proper characteristics for automobile chassis and industrial machinery lubrication.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
Adsorptive properties of the hygroscopic fluids such as glycerine, ethylene glycol, diethylene glycol, and triethanolamine.

Centenary College, Shreveport, La.
Removal of sulphur from petroleum fractions.
Thermal decomposition of certain petroleum fractions.

State of Colorado (in cooperation with the United States Bureau of Mines), Denver, Colo.
Refining study and analytical distillation of shale oil.
Refining of shale oil.

Cosma Laboratories Co., 1545 East 18th Street, Cleveland, Ohio.
Elimination of gum-forming constituents in gasoline.

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The De Laval Separator Co., Poughkeepsie, N. Y.
Centrifugal separation of water and sludge from steam turbine lubricating oils.
Centrifugal purification of Diesel engine lubricating and fuel oils.
Chemical and centrifugal purification of electrical insulating oils.
Chemical and centrifugal reclamation of automobile crank-case oils.
Centrifugal clarification, purification, and processing of dry cleaner's solvent.
Centrifugal separation of gasoline from treating acid, of lubricating oil from treating acid, and of pepper (acid) from treated petroleum products.
Centrifugal dewaxing of lubricating oils.
High-speed test-tube centrifuge for measurement of sediment and water.

The Dorr Co. (Inc), 247 Park Avenue, New York, N. Y.
Gasoline sweetening.
Cracking tars and residuums.
Dewaxing of lubricating oils.
Treatment of refinery wastes.

Eagle Picher Lead Co., 134 North La Salle Street, Chicago, Ill.
Production of lead oxides (particularly litharge and red lead) and their application to customers uses, including use in oil refining.

Empire Oil & Refining Co., Box 2067, Tulsa, Okla.
Refining of motor fuels, lubricants, and various petroleum products.

Ernest Scott & Co., Box 259, Fall River, Mass.
Distillation and recovery of petroleum and solvent naphtha.

University of Florida, College of Pharmacy, Department of Chemistry, Gainesville, Fla.
Rectification of waste engine oil.

General Electric Vapor Lamp Co., 410 Eighth Street, Hoboken, N. J.
The application of ultra-violet in promoting chemical change in refining processes as well as in the production of chemical compounds.

Ginter Chemical Laboratory, 118 West Cameron Street, Tulsa, Okla.
Light and heavy oil treating.

The Helium Co., Shelby Street and Goss Avenue, Louisville, Ky.
Improvement in processes for extraction of helium from natural gas.

Humble Oil & Refining Co., Houston, Tex.
Consideration of the fundamental principles controlling the evaporation of the lighter hydrocarbons from distillates during processing, and also of the methods used in recovering and processing such light hydrocarbons for subsequent utilization as gasoline.
Study of the factors involved in cracking processes with especial reference to the maximum production of desirable products concurrently with the minimum formation of less valuable by-products.

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Hupp Motor Car Corporation, Detroit, Mich.
Relative merits of lubricating oils made from different types of crude, especially in regard to the formation of acids and sludge.

State University of Iowa, Department of Chemical Engineering, Iowa City, Iowa.
The catalytic oxidation of hydrogen sulphide in fuel gas.

Jackson Engineering Corporation, 11 East 5th Avenue, Tulsa, Okla.
Development of calculation methods for predicting light hydrocarbon vapors in absorption, condensation, distillation, and rectification.
Use of triethanolamine in absorption of hydrogen sulphide and carbon dioxide from gases.
Recovery of sulphur or disposal of hydrogen sulphide from foul gases.

Johns Hopkins University, Department of Gas Engineering, School of Engineering, Baltimore, Md.
Purification of gases.

Kansas City Testing Laboratory, 700 Baltimore Avenue, Kansas City, Mo.
Sulphur removal from petroleum and natural gas.

Kendall Refining Co., Bradford, Pa.
Production of antiknock gasoline.
Production of motor oils with low pour-point, lower carbon residue, and demulsibility and greater yields.

Laucks Laboratories (Inc.), 314 Maritime Building, Seattle, Wash.
Refining for domestic use.

Lehigh University, Department of Chemistry, Bethlehem, Pa.
The absorption of gases in liquids relative to the design and operation of light-oil absorption towers.

Lion Oil Refining Co., El Dorado, Ark.
Elimination of sulphur from cracked Smackover gasoline.
Recovery of litharge and caustic from treating plant.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Removal of sulphur from crudes.
Processing of petroleum and natural gas.

Massachusetts Institute of Technology, Research Laboratory of Applied Chemistry, Cambridge, Mass.
Rate of cracking of pure hydrocarbons of low molecular weight.

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Massachusetts Institute of Technology, Department of Fuel and Gas Engineering, Cambridge, Mass.
The solvent refining of lubricating oils.
A determination of the rate of cracking of liquid hydrocarbons.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Petroleum-refining fellowship.

Mid-Continent Petroleum Corporation, Tulsa, Okla.
Methods of increasing yields, lowering costs and improving petroleum products.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
The quantitative distribution of sulphur in the products of distillation of an oil shale.

Mississippi College, Chemistry Department, Clinton, Miss.
Removal of mercaptans from petroleum distillates.
Effect of petroleum-refining agents on sulphur compounds present in petroleum distillates.
Removal of hydrogen sulphide from natural gas.

Mississippi Valley Research Laboratory (Inc.), 660 South 18th Street, St. Louis, Mo.
Development of increased lubrication properties of oils.

Monsanto Chemical Works, 1724 South 2nd Street, St. Louis, Mo.
Recovery and utilization of acid sludge.

Montana State School of Mines, State Bureau Mines and Geology, Butte, Mont.
Effect of ultra-violet rays on the distillation of oil shale.

National Electric Heating Co. (Inc.), 154 Nassau Street, New York, N. Y.
Cracking refractory oils by electric treatment and super-high temperature and pressure.

The National Refining Co., 1404 East 9th Street, Cleveland, Ohio.
Increasing recovery of motor fuel from petroleum.
Adapting properties of motor fuel to high-compression motors.

Northwestern University (in cooperation with the American Petroleum Institute), Evanston, Ill.
Noncatalytic thermal decomposition of pure hydrocarbons and related compounds.

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The Ohio Grease Company, Loudonville, Ohio.
Treatment and compounding of oils and greases to improve properties for lubricating purposes.

University of Oklahoma, School of Petroleum Engineering, Refining Division, Norman, Okla.
Acid sludge.
Lubricating greases.
Paraffin wax crystallization.
Refining of Oklahoma City crude oil.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Contact filtration of petroleum products for brightening and clarification, also for dewaxing.

Pennsylvania State College, State College, Pa.
Methods for the reclamation of oil.

Walter J. Podbielniak, Research Chemical Engineer, 1208 Medical Arts Building, Tulsa, Okla.
Efficient large-scale fractionation of petroleum products.

Portland Gas & Coke Co., Public Service Building, Portland, Oreg.
Recovery of by-products from spent oxide gas purification material.

Princeton University (in cooperation with the American Petroleum Institute), Princeton, N. J.
Specific adsorbents for sulphur compounds in petroleum.

Pure Oil Co., 35 East Wacker Drive, Chicago, Ill.
Development of low-pressure vapor phase cracking process.
Treating vapor phase cracked distillates to make stable motor fuel.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Vapor-phase cracking of petroleum intermediates.

Rodman Chemical Co., Verona, Pa.
Processing and compounding for quenching oils.

St. Bonaventure's College, Department of Chemistry, St. Bonaventure, N. Y.
The removal of wax from paraffin distillates.
Effect of doctor treatment on the amount of sulphur and the nature of the sulphur compounds.

Sharples Specialty Co., 23rd and Westmoreland Streets, Philadelphia, Pa.
Separation of acid sludge from lubricating oils.

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Shell Oil Co., 100 Bush Street, San Francisco, Calif.
Extraction, transportation, distilling, refining, and identification of products and by-products from petroleum and natural gas.

Simms Oil Co., Magnolia Building, Dallas, Tex.
Reduction of gum and sulphur content of cracked gasoline.
Increase benzol equivalent or antiknock rating of gasoline.
Control of end-point rise due to acid treatment.

Sinclair Refining Co., Development Department, East Chicago, Ind.
The stabilization and recovery of light hydrocarbon compounds contained in commercial gasolines.
Study of gum formation in gasoline and means for prevention of same.

Skelly Oil Co., Tulsa, Okla.
Utilization of animal carbon for vapor-phase treating of sulphurous refinery vapors.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Cracking, distillation, and corrosion in petroleum refining.
Production of lubricants.
Specialty products: Wax, candles, polishes, insecticides, medicinal oils.
Asphalt manufacture.
Chemical by-products.

Standard Oil Co. (Ohio), Midland Bank Building, Cleveland, Ohio.
Production of antiknock motor fuel.
Prevention of gum formation in cracked gasoline.
Production of low cold test lubricating oils.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Manufacture of petroleum products, of medicinal oils, insecticides, and specialty products from petroleum.

Pennsylvania State College, State College, Pa.
Fractional distillation of Pennsylvania straight-run gasoline.
Improvements in knocking qualities of Pennsylvania straight-run gasoline.
Studies of Pennsylvania lubricants.

Struthers-Wells Co., Warren, Pa.
Heat transfer, distillation, and chemical treatment as applied to the design and installation of petroleum-refinery equipment.

Texas Pacific Coal & Oil Co., 1710 Ft. Worth National Bank, Ft. Worth, Tex.
Vapor-phase cracking.

Tide Water Oil Co., East 22nd Street, Bayonne, N. J.
Investigation of new methods of petroleum refining.
Development of improved lubricants, fuels, and other products.
Efficiency tests on plant operating units.

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Union Oil Co. of California, Union Oil Building, 617 West 7th Street, Los Angeles, Calif.
Development of new refining processes.
Development of new products and improvements in existing products and processes.
[illegible] petroleum.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Separation of wax from lubricating wax distillates.
Investigation of sulphur compounds in crude oil.
Study of high-sulphur paraffin-base lubricating oils.

United States Bureau of Mines, Petroleum Field Office, Laramie, Wyo.
Removing hydrogen sulphide from natural gas by means of a solution of lime and salt.

United States Bureau of Mines, Petroleum Field Office, San Francisco, Calif.
Removal of asphalt and sulphur compounds from California lubricating crudes by fractional distillation

United States Bureau of Mines, Petroleum Field Office (in cooperation with the State of Colorado), Boulder, Colo.
Refining study and analytical distillation of shale oil.
Refining of shale oil.

United States Bureau of Standards, Washington, D. C.
Reclamation of used automotive lubricating oils.

Universal Oil Products Co., Strauss Building, Chicago, Ill.
Cracking of oils and gases.

Vacuum Oil Co., 61 Broadway, New York, N. Y.
Distillation studies.
Motor-fuel improvement.
Insulating oil improvement.
Lubricating oil improvement.
By-product utilization.

R. B. Vanderbilt Co. (Inc.), 230 Park Avenue, New York, N. Y.; Laboratory, 33 Winfield Street, East Norwalk, Conn.
Use of antioxidants in gasoline.

Wallace and Tiernan Co., Newark, N. J.
Removal of sulphur and its compounds.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
The cracking of petroleum hydrocarbons.

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West Virginia State College, Institute, W. Va.
Utilization of sludges.

White Eagle Oil Corporation, 1400 Federal Reserve Bank Building, Kansas City, Mo.
Corrosion and erosion in refining equipment.
Methods in treating light-oil products.
Yield analyses of operating equipment.

VII. Special Chemical Processing

Alox Chemical Corporation, Buffalo Avenue and Iroquois Street, Niagara Falls, N. Y.
Conversion of by-products of petroleum refining into useful materials, such as intermediate oil (36-40 distillate) to useful fatty acids for many purposes.
Conversion of solid product of the dewaxing processes into useful products, such as soaps, fatty acids, cutting oil, and special oils.

American Petroleum Institute (in cooperation with Princeton University), 250 Park Avenue, New York, N. Y.
Catalytic methods applied to petroleum hydrocarbons.

Arab Gasoline Corporation, Box 997, Eastland, Tex.
The production of formaldehyde, methanol, and other oxygenated compounds from natural gas.
Chemical methods of processing natural gas to increase the yield of natural gasoline obtained therefrom.

Binney & Smith Co., 41 East 42nd Street, New York, N. Y.
Cracking of natural gas.

Boston College, Chestnut Hill, Mass.
Hydrobromination of propylene.

Carnegie Institute of Technology, Department of Chemical Engineering, Schenley Park, Pittsburgh, Pa.
Commercial products from the catalytic oxidation of petroleum hydrocarbons

Colorado School of Mines, Department of Petroleum Engineering, Golden, Colo.
Investigation of heavy fractions produced by pyrolysis.

Columbia University, Department of Chemical Engineering, New York, N. Y.
Hydrogenation of petroleum by use of hydrogen under high pressure.

Continental Industrial Engineers (Inc.), 201 North Wells Streets, Chicago, Ill.
Preparation of partial oxidation compounds of petroleum.

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University of Denver, University Park, Denver, Colo.
Catalytic oxidation of natural gas.

E. I. du Pont de Nemours & Company, Wilmington, Del.
Gas compression and catalyzation.
Studies of general high-pressure synthesis within the field of catalytic gas reactions.

General Electric Vapor Lamp Co., 410 Eighth Street, Hoboken, N. J.
The application of ultra-violet in promoting chemical change in refining processes, as well as in the production of chemical compounds.

Goodyear Tire and Rubber Co., Akron, Ohio.
Oxidation of petroleum hydrocarbons.
Synthesis of useful organic compounds such as butyl chloride, butyl alcohol, and formaldehyde from methane and low-boiling hydrocarbons.

Great Western Electro-Chemical Co., 9 Main Street, San Francisco, Calif.; Plant, Pittsburg, Calif.
Utilization of natural gas for the manufacture of hydrogen, for the manufacture of carbon tetrachloride and for the manufacture of carbon bisulphide.

Hope and affiliated Natural Gas Companies, 545 Wm. Penn Way, Pittsburgh, Pa.
Extracting, processing, and utilizing various hydrocarbons contained in natural gas.

Hydro Engineering and Chemical Co., Corner Newark and North Avenues, Elizabeth, N. J.
Hydrogenation.

University of Illinois, Engineering Experiment Station, Industrial Chemistry Division, Urbana, Ill.
The hydration of unsaturated hydrocarbons.
The partial oxidation of hydrocarbons and other organic compounds in the vapor and liquid phases.

Johns Hopkins University, Department of Gas Engineering, School of Engineering, Baltimore, Md.
The synthesis of organic products from gases.

E. C. Klipstein & Sons Co., Drawer E, South Charleston, W. Va.
The chlorination of petroleum products.

Lehigh University, Department of Chemistry, Bethlehem, Pa.
Pyrolysis of Louisiana natural gas.

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Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Preparation of various products, such as antiknock gas, chemicals, solvents, and alcohols from petroleum.

Massachusetts Institute of Technology, Research Laboratory of Applied Chemistry, Cambridge, Mass.
Mechanism of hydrocarbon cracking reactions involving change in molecular structure such as formation of aromatics from aliphatics.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Modification of petroleum products.

Monsanto Chemical Works, 1724 South 2nd Street, St. Louis, Mo.
Conversion of methane to acetylene.

The National Refining Co., 1404 East 9th Street, Cleveland, Ohio.
Preparation of organic chemicals from petroleum.

University of Oklahoma, School of Petroleum Engineering, Refining Division, Norman, Okla.
Polymerization of hydrocarbons.
Oxidation of petroleum.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., New York, N. Y., and elsewhere.
Making gasoline noninflammable.

Walter J. Podbielniak, Research Chemical Engineer, 1208 Medical Arts Building, Tulsa, Okla.
Pyrolysis of natural gas on a commercial scale.

Princeton University, Princeton, N. J.
Oxidation, pyrolysis, and chlorination of hydrocarbons.
Catalytic reactions of sulphur compounds in naphtha.

Princeton University (in cooperation with the American Petroleum Institute), Princeton, N. J.
Catalytic methods applied to petroleum hydrocarbons.

Pure Oil Co., 35 East Wacker Drive, Chicago, Ill.
Development of process for converting refinery fixed gases into liquid motor fuel.

The Rice Institute, Department of Chemical Engineering, Houston, Tex.
Industrial products using natural gas as raw material.

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Shell Development Co., 100 Bush Street, San Francisco, Calif.; Research Laboratories, Emeryville, Calif.
The better utilization of petroleum by-products and natural gas, particularly in new chemical products.

Shelly Oil Co., Tulsa, Okla.
Utilization of propane and butane for manufacture of benzol and other aromatics.
Utilization of waste residuum (sp. gr. 1.2) from cracking units.

Standard Oil Co. of New Jersey and its Subsidiaries, 26 Broadway, New York, N. Y.
Manufacture of alcohols from refinery gases.

Standard Oil Co. of New York, General Laboratories, 412 Greenpoint Avenue, Brooklyn, N. Y.
Reformation, oxidation and catalysis of hydrocarbons.

Standard Oil Co. (Ohio), Midland Bank Building, Cleveland, Ohio.
Conversion or utilization of low value by-products such as gas and heavy residuums.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Manufacture of alcohols and other chemicals from petroleum gases.

Sun Oil Co., 1608 Walnut Street, Philadelphia, Pa.
The oxidation of petroleum hydrocarbons for the production of organic acids.
The polymerizations of olefines and their reaction with other hydrocarbons.

The United Gas Improvement Co., Physical Laboratory, 3101 Passyunk Avenue, Philadelphia, Pa.
The reformation of hydrocarbons.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Hydrolysis of natural gas.
Influence of temperature, surface, and homogeneous catalysts on yield of acetylene and ethylene from natural gas.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Synthesis of hydrocarbon motor fuels.

United States Bureau of Standards, Washington, D. C.
Effect of constitution on the oxidation of hydrocarbons.

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Vacuum Oil Co., 61 Broadway, New York, N. Y.
Pyrolysis and polymerization studies.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
Synthetic chemicals from petroleum and natural gas.

Wesleyan University, Department of Chemistry, Middletown, Conn.
The catalytic oxidation of petroleum with cheap material.
The pyrolysis of hydrocarbons in the presence of carbon monoxide.

Yale University, Department of Chemical Engineering, Sterling Chemistry Laboratory, 225 Prospect Street, New Haven, Conn.
Catalytic high-pressure gas reactions of the sort now being applied in the commercial production of ammonia and of methanol and in the manufacture of motor fuel from coal.

VIII. Utilization: Motor Fuels and Lubricants

Alox Chemical Corporation, Buffalo Avenue and Iroquois Street, Niagara Falls, N. Y.
Bodies adsorbed upon metals for increasing oiliness of petroleum lubricating oils, including cutting oils, heavy bearing oils, broaching oils, steam-cylinder oils, cup greases, roll-neck greases, lead-soap greases and oils.

American Petroleum Institute (in cooperation with the National Automobile Chamber of Commerce, the Society of Automotive Engineers, and the United States Bureau of Standards), 250 Park Avenue, New York, N. Y.
Gasoline in its relation to automotive engine performance.

University of Arkansas, Engineering Experiment Station, Fayetteville, Ark.
Positive metering and distribution of gasoline in the internal-combustion engine.

Atchison, Topeka & Santa Fe Railway Co., Test Department, Crane and Branner Streets, Topeka, Kans.
Development of an all-weather railway car oil.

Chas. V. Bacon, 3 Park Row, New York, N. Y.
The use and application of crude and finished petroleum to the industries with especial reference to motor, diesel, domestic and industrial fuel.
Selection of lubricants for specific work.

Bendix Research Corporation, 401 North Bendix Drive, South Bend, Ind.
Use of fuels in internal-combustion engines.

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Cadillac Motor Car Co., Detroit, Mich.
Development of steering-gear lubricant with flat viscosity slope, good cold properties, and heavy body when hot.

California Agricultural Experiment Station, College of Agriculture, Davis, Calif.
A study of bearing wear as affected by the character and condition of the lubricant, especially crankcase oil filters and their effect on engine wear.
Air cleaners for the carburetors of internal-combustion engines.

Cooper-Bessemer Corporation, Mt. Vernon, Ohio.
Effect of fuel composition on combustion in the Diesel engine.

General Motors Corporation, Research Laboratories, Detroit, Mich.
The improvement of methods of utilizing gasoline in the automobile engine and by means of making gasoline knock-free.
Means of utilizing petroleum oils in constant-volume or injection-type engines.
Improvement of petroleum oil lubricants.

University of Illinois, Agricultural Experiment Station, Urbana, Ill.
Gas-engine, crank-case lubricating oil studies.

University of Illinois, Engineering Experiment Station and Department of Mechanical Engineering, Urbana, Ill.
Radiometric study of explosions in a gasoline engine.

International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.
Utilization of lubricants and liquid fuels in agricultural machinery.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Preparation of antiknock gas from petroleum.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Investigations of the relation of motor-fuel characteristics to engine performance.

Moraine Products Co., 329 East First Street, Dayton, Ohio.
Plain and porous metal bearing lubrication.

National Automobile Chamber of Commerce (in cooperation with the American Petroleum Institute, the Society of Automotive Engineers and the United States Bureau of Standards), 366 Madison Avenue, New York, N. Y.
Gasoline in its relation to automotive-engine performance.

Neville Chemical Co., Pittsburgh, Pa.
The effect of benzol on the performance of motor gasoline.

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New York Edison Co., 4 Irving Place, New York, N. Y.
The sludging of turbine oils.

University of Oklahoma, School of Petroleum, Engineering, Refining Division, Norman, Okla.
Lubrication.

Pennsylvania State College, State College, Pa.
The value of reclaimed oil for purposes of lubrication.

Society of Automotive Engineers (in cooperation with the American Petroleum Institute, the National Automobile Chamber of Commerce and the United States Bureau of Standards), 29 West 39th Street, New York, N. Y.
Gasoline in its relation to automotive-engine performance.

Spicer Manufacturing Corporation, 4100 Bennett Road, Toledo, Ohio.
Nonfluid lubricants for motor-car chassis and similar applications.

Standard Oil Co. (Indiana), 910 South Michigan Avenue, Chicago, Ill.
Use of gas as an internal-combustion engine fuel.

Standard Oil Co. of New York, General Laboratories, 412 Greenpoint Avenue, Brooklyn, N. Y.
Automotive fuel and lubricants.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Application of fuels to internal-combustion engines.

Super Diesel Tractor Corporation, Box 23, LaPorte, Ind.
Devices, nozzles and pumps for solid injection of fuel in internal-combustion engines.

United States Bureau of Standards, Washington, D. C.
Dilution of crank-case oils.
Engine tests of lubricants.
Gaseous fuel carburetor.
Lubrication of aircraft engines under starting conditions.
Piston lubrication.
Thin film lubrication.
Lubricants for fine mechanism.
Vapor lock in airplane fuel systems.

United States Bureau of Standards (in cooperation with the Society of Automotiv Engineers, the American Petroleum Institute, and the National Automobile Chamber of Commerce), Washington, D. C.
Gasoline in its relation to automotive-engine performance.

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State College of Washington, Engineering Experiment Station, Pullman, Wash.
Automobile engine lubricating: Laboratory comparison of various types of oil as used in a good engine under normal load conditions, testing change in oil, wear in engine, and iron in oil.
A review of the present knowledge of the theory of bearing lubrication and tests with a new type of viscometer and a test bearing, with the object of relating oiliness to other simpler physical properties.

Waukesha Motor Co., Waukesha, Wis.
Internal combustion engine fuel utilization.

Western Clock Co., La Salle, Ill.
Fine clock lubricants.

White Eagle Oil Corporation, 1400 Federal Reserve Bank Building, Kansas City, Mo.
Automotive properties of refined oils.

Yale University, Sheffield Scientific School, Department of Mechanical Engineering, Mason Laboratory, 400 Temple Street, New Haven, Conn.
Internal combustion engine performance on block and chassis dynamometer tests, with particular reference to fuel utilization and detonation.
Investigation of explosion characteristics of various gaseous mixtures, rate of flame front propagation and detonation in internal-combustion engines.

IX. Utilization: Carbon Black

Binney & Smith Co., 41 East 42nd Street, New York, N. Y.
Production of carbon black.

R. H. Brownlee Laboratory (Inc.), 223 Fourth Avenue, Pittsburgh, Pa.
Development of new process and apparatus for making carbon black.

Columbian Carbon Co. (in cooperation with the West Virginia University), 40 East 42nd Street, New York, N. Y.
Utilization of natural gas in carbon-black manufacture.

Godfrey L. Cabot (Inc.), 940 Old South Building, Boston, Mass.
The production of carbon blacks from natural gas.
Incorporation of carbon black in rubber and inks.

Firestone Tire & Rubber Co., Firestone Park, Akron, Ohio.
Evaluation of carbon black for rubber compounding.
Dispersion of carbon black in rubber.

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French Battery Company, 2317 Winnebago Street, Madison, Wis.
Carbon-black utilization in dry-cell manufacture.

Goodyear Tire & Rubber Co., Akron, Ohio.
Improved methods of producing carbon black.

Chas. Eneu Johnson & Co., 10th and Lombard Streets, Philadelphia, Pa.
Improving manufacturing process for carbon black.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Preparation of various products such as carbon black from petroleum.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Carbon-black fellowship.

Rensselaer Polytechnic Institute, Troy, N. Y.
Oil-in-water emulsions with carbon black as emulsifier.

Simplex Wire & Cable Co., 201 Devonshire Street, Boston, Mass.
Use of carbon black in rubber insulation.

Thermatomic Carbon Co., 108 Ferry Street, Pittsburgh, Pa.
The development of conservation methods for the manufacture of carbon.
The development of wider uses for thermatomic carbons in the rubber, paint, and ink industries.

West Virginia University, Division of Industrial Sciences (in cooperation with the Columbian Carbon Co.), Morgantown, W. Va.
Utilization of natural gas in carbon-black manufacture.

X. Utilization: Furnaces and Combustion

(Problems on boiler water and its treatment are listed under Section C-XIII. Problems on corrosion are listed under Section D-V.)

American Gas Association, Committee on Industrial Gas Research (in cooperation with the American Gas Furnace Co. and Mr. Robert Guthrie), 420 Lexington Avenue, New York, N. Y.
Application of gas heat to brass melting.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the C. M. Kemp Manufacturing Co.), 420 Lexington Avenue, New York, N.Y.
Development of gas immersion heating elements for galvanizing tanks, and zinc-base die casting.

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American Gas Association, Committee on Industrial Gas Research (in cooperation with C. M. Kemp Manufacturing Co. and the Consolidated Gas Co. of New York), 420 Lexington Avenue, New York, N. Y.
Development of immersion stereotype melting equipment.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the University of Michigan), 420 Lexington Avenue, New York, N.Y.
The application of heat to core baking.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the National Machine Works), 420 Lexington Avenue, New York, N.Y.
Improvement of oven-furnace design.

American Gas Association, Committee on Industrial Gas Research (in cooperation with Rutgers University), 420 Lexington Avenue, New York, N. Y.
Improving practices and efficiencies in the utilization of natural gas in the firing of ceramic wares.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation), 420 Lexington Avenue, New York, N. Y.
Development of large-sized short-tunnel burners.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation and the University of Michigan 420 Lexington Avenue, New York, N. Y.
The utilization of gas for forging.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation and the Standard Gas Equipment Corporation), 420 Lexington Avenue, New York, N. Y.
Development of refractory diaphragm burners.

American Gas Association, Testing Laboratory, Cleveland, Ohio.
Ignition velocities of various fuel gases.
Utilization characteristics of butane-air and butane-city gas mixtures.
Burning gas with preheated air.
Development of standard requirements.
The elimination of noises in industrial gas burners.
Effects of external factors upon the efficiency of gas-fired steam and hot-water radiators.
Fundamentals of combustion space requirements in industrial gas furnaces.

American Gas Furnace Co. (in cooperation with the American Gas Association and Mr. Robert Guthrie), Elizabeth, N. J.
Application of gas heat to brass melting.

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American Oil Burner Association (Inc.) (in cooperation with the American Society of Heating and Ventilating Engineers and Yale University), 342 Madison Avenue, New York, N. Y.
Study of performance of oil burners in various types of boilers, furnaces and heating systems.
Study of combustion of fuel oil.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Combustion and efficient use of gas in heating furnaces.

American Society of Heating and Ventilating Engineers (in cooperation with the American Oil Burner Association (Inc.), and Yale University), 4800 Forbes Street, Pittsburgh, Pa.
Study of combustion of fuel oil.
Study of performance of oil burners in various types of boilers, furnaces and heating systems.

American Society of Heating and Ventilating Engineers (in cooperation with Carnegie Institute of Technology), 4800 Forbes Street, Pittsburgh, Pa.
Sizes of steam pipes in low-temperature heating systems.

American Society of Mechanical Engineers (in cooperation with the University of Oklahoma), 29 West 39th Street, New York, N. Y.
The efficiencies of boilers used in drilling a rotary-drilled oil well.

Bailey Meter Co., 1050 Ivanhoe Road, Cleveland, Ohio.
Combustion control of oil and natural-gas burners.

California Agricultural Experiment Station, College of Agriculture, Davis, Calif.
Study of orchard heaters, including weighing smoke per unit volume of gases emitted and correlating with fuel consumption rate.

University of California, Department of Mechanical Engineering, Berkeley, Calif.
Flame propagation of certain designs of natural-gas atmospheric burners.

Carnegie Institute of Technology, College of Industries, Schenley Park, Pittsburgh, Pa.
Performance of unit heaters.
Performance of low pressure steam heating boilers.

Carnegie Institute of Technology (in cooperation with the American Society of Heating and Ventilating Engineers), Schenley Park, Pittsburgh, Pa.
Sizes of steam pipes in low-temperature heating systems.

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Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
The utilization of natural gas for economically and safely heating and [illegible] under controlled conditions.
The application of fuel oil and natural gas to combustion under special designs of boilers or generators and furnaces for household and other applications.

Columbia University, Department of Mechanical Engineering, New York, N. Y.
Combustion and furnaces with burners, stokers and other appliances for heat release from fuels.
Heat transfer processes and apparatus.

Combustion Utilities Corporation, 60 Wall Street, New York, N. Y.
Utilization of natural gas.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Nonquenching gas-range burner.
Safety controls for gas appliances.

Consolidated Gas Co. of New York, Laboratories (in cooperation with the American Gas Association and the C. M. Kemp Manufacturing Co.), 4 Irving Place, New York, N. Y.
Development of immersion stereotype melting equipment.

Corning Glass Works, Corning, N. Y.
More effective utilization of gas and oil in the manufacture of glass.
Furnace design.

Detroit Edison Co. (in cooperation with the University of Michigan), 2000 Second Avenue, Detroit, Mich.
Spectrographic analysis of gas.

Detroit Edison Co. (in cooperation with the Superheater Co. and Yale University), 2000 Second Avenue, Detroit, Mich.
Radiation, heat absorption, and progress of combustion.

University of Detroit, Department of Mechanical Engineering, Detroit, Mich.
Capacity and efficiency of oil burners.

C. A. Dunham Co., Marshalltown, Iowa.
Improvement in heating systems for buildings.

Mr. Robert Guthrie, Consulting Metallurgist (in cooperation with the American Gas Association and the American Gas Furnace Co.), 122 South Michigan Avenue, Chicago, Ill.
Application of gas heat to brass melting.

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Hagan Corporation, 304 Ross Street, Pittsburgh, Pa.
Combustion control.

Harrop Ceramic Service Co., 310 West Broad Street, Columbus, Ohio.
Use of natural gas for firing lime.

University of Illinois, Urbana, Ill.
Removal of sulphur from stack gases.

University of Illinois, Engineering Experiment Station, Urbana, Ill.
Method of removing harmful and corrosive constituents from the flue gases of a power plant.

University of Illinois (in cooperation with the Utilities Research Commission, Incorporated), Urbana, Ill.
Stack gases and their purification.

University of Illinois, Engineering Experiment Station, Department of Mechanical Engineering (in cooperation with the National Warm Air Heating Association), Urbana, Ill.
Performance of warm-air furnaces and furnace heating systems.

International Combustion Engineering Corporation, 200 Madison Avenue, New York, N. Y.
Combustion of fuels.
Heat transfer from burning fuel and products of combustion to water-cooled surfaces.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
Study of the economy of a gas-fired boiler for domestic heating.

Jackson Engineering Corporation, 11 East Fifth Avenue, Tulsa, Okla.
Use of triethanolamine in absorption of hydrogen sulphide and carbon dioxide from gases.
Recovery of sulphur or disposal of hydrogen sulphide from foul gases.

Johns Hopkins University, Baltimore, Md.
A study of chimney performance.

Johns Hopkins University, Department of Mechanical Engineering, Baltimore, Md.
Study of the economic distribution of heating surface in large boilers, between water walls, boiler surface, economizer surface and air preheater surface.

Johns Hopkins University, Department of Mechanical Engineering (in cooperation with the United States Department of Agriculture), Baltimore, Md.
Performance of oil burners.

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Kansas State Agricultural College, Engineering Experiment Station, Manhattan, Kans.
Use of oil and gas as fuel in house-heating boilers.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association), Baltimore, Md.
Development of gas immersion heating elements for galvanizing tanks, and zinc-base die casting.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association and the Consolidated Gas Co. of New York), Baltimore, Md.
Development of stereotype immersion melting equipment.

Kewanee Boiler Corporation, Kewanee, Ill.
Performance characteristics of heating boilers.

Los Angeles Gas and Electric Corporation, Los Angeles, Calif.
Manufacture of gas from oil.

Massachusetts Institute of Technology, Department of Fuel and Gas Engineering, Cambridge, Mass.
Heat transmission in furnaces.
Industrial furnace design.

Massachusetts Institute of Technology (in cooperation with the National Research Council), Cambridge, Mass.
Measurement of total radiation from hot gases.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Natural-gas fellowship.

University of Michigan, Department of Chemical Engineering, Ann Arbor, Mich.
Development of high-temperature heating by means of high-boiling organic vapors.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Methods of heating asphalt.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association), Ann Arbor, Mich.
The application of heat to core baking.

The University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association and the Surface Combustion Corporation), Ann Arbor, Mich.
The utilization of gas for forging.

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University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Spectrographic analysis of gas.

University of Michigan, Department of Engineering Research (in cooperation with the Utilities Research Commission, Incorporated), Ann Arbor, Mich.
Brass melting by city gas.

Minneapolis-Honeywell Regulator Co., Wabash, Ind.
Temperature control in furnaces.

Mississippi Valley Research Laboratory (Inc.), 660 South 18th Street, St. Louis, Mo.
Gasification of crude oils.
Investigation of the best construction of furnaces and burners for the utilization of natural gas.

National Machine Works (in cooperation with the American Gas Association), 1559 Sheffield Avenue, Chicago, Ill.
Improvement of oven-furnace design.

National Research Council, Committee on Heat Transmission, 2101 B Street, N.W., Washington, D. C.
Measurement of radiation from nonluminous gases and flames.

National Research Council, Committee on Heat Transmission (in cooperation with the Massachusetts Institute of Technology), 2101 B. Street, N.W., Washington, D. C.
Measurement of total radiation from hot gases.

National Warm Air Heating Association (in cooperation with the University of Illinois), 174 East Long Street, Columbus, Ohio.
Performance of warm-air furnaces and furnace heating systems.

New York Edison System, 4 Irving Place, New York, N. Y.
Investigation of possible hydrocarbon stack loss.

Ohio State University, Engineering Experiment Station (in cooperation with the United States Bureau of Mines), Columbus, Ohio.
A study of the burning characteristics of fuels in ceramic kilns.

University of Oklahoma, School of Mechanical Engineering (in cooperation with the American Society of Mechanical Engineers), Norman, Okla.
The efficiencies of boilers used in drilling a rotary-drilled well.

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Oregon State Agricultural College, Mechanical Engineering Department, Corvallis, Oreg.
Study of the burning of fuels in a furnace wherein pressure is maintained at about 7 atmospheres.
Introduction into boilers of make-up steam instead of make-up water.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, Calif.
Industrial commercial applications of natural gas in lieu of other fuels as well as improvements in the employment of natural gas.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas Engineering, State College, Pa.
Effect of physical properties of oil and orifice dimension on spray formation.

Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, Ill.
Fundamentals of gaseous combustion.

Pittsburgh Plate Glass Co., Window Glass Research Department, Mt. Vernon, Ohio.
The use of natural gas in the melting and fabricating of window glass.

Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Comparative tests of house-heating boilers using coal, oil, and gas.
Comparative tests of automatic temperature controls.
Study and comparative tests of gas-burner venturis.

Purdue University, Engineering Experiment Station (in cooperation with the Indiana Gas Association), Lafayette, Ind.
Comparative heating value of gas, oil, coal, and coke in house heating.

Research Corporation, Washington, D. C.
Elimination of sulphur fumes from combustion gases.

W. S. Rockwell Co., South Church Street, New York, N. Y.
Better methods of utilizing oil and gas for industrial heating operations in the metal, ceramic, and chemical industries through improved furnace design.

Rutgers University (in cooperation with the American Gas Association), New Brunswick, N. J.
Improving practices and efficiencies in the utilization of natural gas in the firing of ceramic wares.

Southern Counties Gas Co., 810 South Flower Street, Los Angeles, Calif.
The burning of lime in shaft kilns with natural gas.

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Standard Gas Equipment Corporation (in cooperation with the American Gas Association and the Surface Combustion Corporation), 18 East 41st Street, New York, N. Y.
Development of refractory diaphragm burners.

Standard Oil Development Co., 26 Broadway, New York, N. Y.
Application of fuels to household and industrial heating plants and gas manufacture.

Stevens Institute of Technology, Hoboken, N. J.
Study of atmospheric contamination, its sources as relating to fuel combustion, and its effect, both mechanical and chemical.

Stitzer and Waddell, 1540 Nicholas Building, Toledo, Ohio.
Adaptation of gas-burner equipment for use with various fuel gases.

Superheater Co. (in cooperation with the Detroit Edison Co. and Yale University), 17 East 42nd Street, New York, N. Y.
Radiation, heat absorption, and progress of combustion.

Surface Combustion Corporation, 2375 Dorr Street, Toledo, Ohio.
Applications of new methods of combustion to metallurgical operations.

Surface Combustion Corporation (in cooperation with the American Gas Association), 2375 Dorr Street, Toledo, Ohio.
Development of large-sized short-tunnel burners.

Surface Combustion Corporation (in cooperation with the American Gas Association and the University of Michigan), 2375 Dorr Street, Toledo, Ohio.
The utilization of gas for forging.

Surface Combustion Corporation (in cooperation with the American Gas Association and the Standard Gas Equipment Corporation), 2375 Dorr Street, Toledo, Ohio.
Development of refractory diaphragm burners.

The United Gas Improvement Co., Physical Laboratory, 3101 Passyunk Avenue, Philadelphia, Pa.
The reformation of hydrocarbons.
Study of gas-oil efficiency.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with Ohio State University), Pittsburgh, Pa.
A study of the burning characteristics of fuels in ceramic kilns.

United States Bureau of Standards, Washington, D. C.
Standards for gas service: The best practice and the requirements made by municipal and state regulatory bodies in the manufacture, distribution, metering and utilization of fuel gases by public utilities.
Investigation of the safety and efficiency of utilization of gas.

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United States Department of Agriculture (in cooperation with the Johns Hopkins University), Washington, D. C.
Performance of oil burners.

Utilities Research Commission (Inc.) (in cooperation with the University of Illinois), 72 West Adams Street, Chicago, Ill.
Stack gases and their purification.

Utilities Research Commission (Inc.) (in cooperation with the University of Michigan), 72 West Adams Street, Chicago, Ill.
Brass melting by city gas.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
Development of an improved hot-water furnace for domestic use.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
A study of the mechanism of the kinetics of the homogeneous oxidation of hydrocarbons.

Williams Oil-O-Matic Heating Corporation, Bloomington, Ill.
Development of devices to handle oils generally and commercially available.

Yale University, New Haven, Conn.
Performance of oil burners on various types of boilers and furnaces.

Yale University, Sheffield Scientific School, Department of Mechanical Engineering, Mason Laboratory, 400 Temple Street, New Haven, Conn.
Investigation of operating characteristics of oil burners and heating boilers.
Test code for oil burners for low pressure heating boilers.
Performance of low pressure heating boilers using various fuels.
Studies of the combustion process in power boiler furnaces.
Economic performance of furnaces, and boilers, radiators, heat cabinets, hot-blast heaters, etc.

Yale University (in cooperation with the American Oil Burner Association (Inc.) and the American Society of Heating and Ventilating Engineers), New Haven, Conn.
Study of performance of oil burners in various types of boilers, furnaces, and heating systems.
Study of combustion of fuel oil.

Yale University (in cooperation with the Detroit Edison Co. and the Superheater Co.), New Haven, Conn.
Radiation, heat absorption, and progress of combustion.

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XI. Utilization: Miscellaneous

Alox Chemical Corporation, Buffalo Avenue and Iroquois Street, Niagara Falls, N. Y.
Acids (fatty) for rubber accelerator activation.

American Gas Association, 420 Lexington Avenue, New York, N. Y.
Commercial refrigeration with gas.

American Gas Association (in cooperation with the United States Bureau of Standards and the American Petroleum Institute), 420 Lexington Avenue, New York, N. Y.
Protective coatings for pipe-line protection.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Silica Gel Corporation, the Peoples Gas Light & Coke Co., the Consolidated Gas Co. of New York, and the Dallas Gas Co.), 420 Lexington Avenue, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

American Petroleum Institute (in cooperation with the American Gas Association and the United States Bureau of Standards), 250 Park Avenue, New York, N.Y.
Protective coatings for pipe-line protection.

Anderson Prichard Oil Corporation, Oklahoma City, Okla.; Laboratories, Chicago, Ill.
The essential characteristics required by naphthas for utilization as industrial solvents.
Effect of evaporation rates on suitability of naphtha as a solvent.
Effect of degree of refining on suitability of naphtha as a solvent.

The Barber Asphalt Co., Technical Bureau, Maurer, N. J.
Development of new uses for asphalt.

Bird and Son (Inc.), Research Department, East Walpole, Mass.
General problems of manufacture of asphalt roofing.

The Brooklyn Union Gas Co., 191 St. James Place, Brooklyn, N. Y.
Cracking problems of gas oil.

R. H. Brownlee Laboratory (Inc.), 223 Fourth Avenue, Pittsburgh, Pa.
Process and equipment for making hydrogen from oil and natural gas.

California Agricultural Experiment Station, Davis, Calif.
The efficiency of petroleum-oil animal sprays and their effect on the health and production of dairy cows.

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California Division of Highways, Sacramento, Calif.
Stability of asphalt mixtures and sands.

California Division of Highways (in cooperation with the United States Bureau of Public Roads), Sacramento, Calif.
Comparison of various types of asphalt emulsions and other bituminous binders proposed for surfacing projects and maintenance patches.
The volume and weight of traffic that may be economically carried by light-oil surfaces, and the effect of soil and climatic conditions on such surfaces.

Certain-teed Products Corporation, York, Pa.
Suitability of various petroleum asphalts for the manufacture of composition or prepared roofings.

Colorado Agricultural Experiment Station, Fort Collins, Colo.
Road oils.
Light asphaltic road surfaces.

Columbia University, Department of Chemical Engineering, New York, N. Y.
Study of the usefulness of shale oil as an agricultural insecticide and as an insecticide for spraying livestock.

Condit Electrical Manufacturing Corporation, 1344 Hyde Park Avenue, Hyde Park, Mass.
Use of petroleum products as insulation and cooling mediums in electrical apparatus, with special reference to the use of mineral oil for insulating and arc quenching medium in circuit breakers and transformers.

Consolidated Gas Co. of New York (in cooperation with the American Gas Association, the Silica Gel Corporation, the Peoples Gas Light & Coke Co., and the Dallas Gas Co.), 4 Irving Place, New York, N. Y.
Development of gas-operated house-cooling and air-conditioning equipment.

Cornell University, College of Engineering, Ithaca, N. Y.
Oils as insulating medium in electric cables.

Dallas Gas Co. (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Peoples Gas Light & Coke Co., and the Silica Gel Corporation), Dallas, Tex.
Development of gas-operated house-cooling and air-conditioning equipment.

Dow and Smith, 131 East 23rd Street, New York, N. Y.
Increase in weathering properties and waterproofing properties of asphalt and heavy petroleum products by the admixture of different minerals and/or mineral powders.
Interfacial surface tension of different minerals for asphalts and heavy petroleum products looking to the improvement of bituminous paving mixtures and road surfaces.

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E. I. du Pont de Nemours & Co., Parlin Laboratory, Parlin, N. J.
Utilization of petroleum hydrocarbons as substitutes for benzol and toluol in nitrocellulose lacquers and solutions.

Firestone Tire & Rubber Co., Firestone Park, Akron, Ohio.
Petroleum products as softeners of raw rubber.

The Gabriel Co., 1407 East 40th Street, Cleveland, Ohio.
Mineral oils in connection with hydraulic shock absorbers.
Oils with minimum change in viscosity due to temperature (-10° to 140°).

General Cable Corporation, High Tension Research Laboratories, 26 Washington Street, Perth Amboy, N. J.
Petroleum products for use as cable saturants and other electrical insulating purposes.

The B. F. Goodrich Co., Akron, Ohio.
The utilization of petroleum products in the rubber industry.

Grand Rapids Varnish Corporation, 565 Godfrey Avenue, SW, Grand Rapids, Mich.
Utilization of petroleum distillates in the manufacturing of paints and varnishes.

The James H. Herron Co., 1360 West Third Street, Cleveland, Ohio.
Development of a water-soluble base for cutting oil.

Humble Oil & Refining Co., Houston, Tex.
Utilization of by-products formed as the result of the production of prime products.

University of Idaho, Department of Entomology, Moscow, Idaho.
Petroleum oils used as insecticides.

Institute of Paint and Varnish Research, 2201 New York Avenue, N.W., Washington, D. C.
Investigation of paint thinners.

Iowa State Highway Commission, Ames, Iowa.
Expansion joint materials.

Chas. Enau Johnson & Co., 10th and Lombard Streets, Philadelphia, Pa.
Producing new materials from gas.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Utilization of asphalts in the manufacture of paper boards and roofing, and in many other ways as a plastic and a binder.
Utilization of petroleum and natural gas.

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University of Maryland, Agricultural Experiment Station, College Park, Md.
Mineral oils and oxydized mineral oils as insecticides.

Massachusetts Agricultural College, Experiment Station, Amherst, Mass.
Systematic study of oil sprays.

Minnesota Agricultural Experiment Station, St. Paul, Minn.
The application of chlorpicrin, the chlorpicrin-carbon tetrachloride mixture (Chapman patent), or other modification of chlorpicrin to industrial fumigation.

Minnesota Agricultural Experiment Station, University Farm, St. Paul, Minn.
Developments of insecticides for orchard spraying, potato spraying, scale-insect control and root-maggot control.

Mississippi Valley Research Laboratory (Inc.), 660 South 18th Street, St. Louis, Mo.
Gasification of crude oils.

Montana Agricultural Experiment Station, Entomology Department, Bozeman, Mont.
A study of lubricating oils to discover effective sprays for use in orchards, shade trees, and for any injurious insects where oil sprays will be useful.

Montana Agricultural Experiment Station (in cooperation with the Western Cooperative Oil Spray Conference), Bozeman, Mont.
The determination of the relations of physical and chemical properties of mineral oils to their toxicity to insects and plants.
The determination of the physical factors involved in the preparation of emulsions of oils and the effect of these factors on the toxicity of the emulsions to insects and plants.

National Carbon Co. (Inc.), Cleveland, Ohio.
Carbon electrodes.

Natural Gasoline Association of America (in cooperation with member companies), 305 Tulsa Building, Tulsa, Okla.
Liquified petroleum gases.
New preparations and uses of the lighter hydrocarbons.

Nebraska State Highway Department, Lincoln, Neb.
Low-cost bituminous road investigation.

New Mexico State Highway Department, Santa Fe, N. Mex.
Determination of grading and per cent of oil to use that will give the most satisfactory results obtainable with given aggregates and a given asphaltic-base road oil.

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The Ohio Grease Co., Loudonville, Ohio.
Utilization of greases of various properties.

Pacific Gas & Electric Co., San Francisco, Calif.
Design of oil sprays.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas Engineering, State College, Pa.
Effect of physical properties of oil and orifice dimension on spray formation.

Peoples Gas Light & Coke Co. (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Dallas Gas Co., and the Silica Gel Corporation), 122 South Michigan Avenue, Chicago, Ill.
Development of gas-operated house-cooling and air-conditioning equipment.

Portland Gas & Coke Co., Public Service Building, Portland, Oreg.
Mechanical sacking of fuel briquets made from carbon residue from oil gas manufacture.
Improving durability of fuel briquets made from carbon residue from oil-gas manufacture.

Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill.
Sludging and break-down of insulating oil used in electric flow meter bodies.

The Ruberoid Co., 95 Madison Avenue, New York, N. Y.
Bituminous materials for use as waterproofing and protective coatings and paints.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Insecticides and fungicides containing petroleum.

Silica Gel Corporation (in cooperation with the American Gas Association, the Consolidated Gas Co. of New York, the Dallas Gas Co., and the Peoples Gas Light & Coke Co.), Garratt Building, Baltimore, Md.
Development of gas-operated house-cooling and air-conditioning equipment.

Sinclair Refining Co., Development Department, East Chicago, Ind.
Manufacture of molding and varnish resins from by-products of petroleum-treating processes.

Speer Carbon Co., St. Marys, Pa.
Use of various types of petroleum coke and allied materials.

Stackpole Carbon Co., Tannery Street, St. Marys, Pa.
The reduction of metallic oxides by natural gas.

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Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, Ill.
Study of oil sprays.
Asphalt utilization.

Standard Oil Co. of New Jersey, New York, N. Y.
Study of various oil sprays.

Standard Oil Co. of New York, General Laboratories, 412 Greenpoint Avenue, Brooklyn, N. Y.
Research on, and development of, protective coatings.

Standard Oil Co. (Ohio), Midland Bank Building, Cleveland, Ohio.
Conversion or utilization of low-value by-products such as gas and heavy residuums.

Texas Pacific Coal & Oil Co., 1710 Ft. Worth National Bank, Ft. Worth, Tex.
Lead-soap greases.

Thermatomic Carbon Co., 108 Ferry Street, Pittsburgh, Pa.
The use of the hydrogen resultant gas from the thermatomic process (85 per cent hydrogen).
Development of wider uses for thermatomic carbons in the rubber, paint and ink industries.

The Twining Laboratories, 2527 Fresno Street, Fresno, Calif.
Oil sprays and emulsions for insecticides.
Uses for heavy oil.

Union Oil Co. of California, Union Oil Building, 617 West 7th Street, Los Angeles, Calif.
Better utilization of by-products of refining.

The United Gas Improvement Co., Physical Laboratory, 3101 Passyunk Avenue, Philadelphia, Pa.
Study of gas-oil efficiency.

United States Bureau of Mines, Rare and Precious Metals Experiment Station (in cooperation with the University of Nevada), Reno, Nev.
Continuous zinc smelting with natural gas.

United States Bureau of Public Roads, Washington, D. C.
Bituminous treatment of sandy-soil roads.
Bituminous treatment of crushed-stone and gravel roads.

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United States Bureau of Public Roads (in cooperation with the California Division of Highways), Washington, D. C.
Comparison of various types of asphalt emulsions and other bituminous binders proposed for surfacing projects and maintenance patches.
The volume and weight of traffic that may be economically carried by light-oil surfaces, and the effect of soil and climatic conditions on such surfaces.

United States Bureau of Standards, Washington, D. C.
Cutting fluids.

United States Bureau of Standards (in cooperation with the American Gas Association and the American Petroleum Institute), Washington, D. C.
Protective coatings for pipe-line protection.

State College of Washington, Agricultural Experiment Station, Pullman, Wash.
Factors influencing the selection of oil sprays.

Western Washington Experiment Station, Puyallup, Wash.
Oil-spraying experiments for control of insect pests.

XII. - Safety, Health, and Economics

American Gas Association, Testing Laboratory, 1032 East 62nd Street, Cleveland, Ohio.
Development of standard requirements.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Relative costs and applications of coal, petroleum, and natural gas as fuels.

University of Arkansas, Fayetteville, Ark.
Comparative costs of coal and natural gas for domestic heating.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
Physical and chemical properties, including inflammability and toxicity, of a number of halogen derivatives of the hydrocarbons, more especially dichlorethylene, trichlorethylene, tetrachlorethylene (these last two primarily as vapor solvents), dichloromethane, pentachlorethane, and orthodichlorbenzine.

Caterpillar Tractor Co., Peoria, Ill.
Safety and health pertaining to the industrial use of natural gas and butane gas.

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Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Nonquenching gas range burner.
Safety controls for gas appliances.

Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y.
Safe use of tetraethyl lead.

Ginter Chemical Laboratory, 118 West Cameron Street, Tulsa, Okla.
Oil-field pollution problems.

John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York, N. Y.
Developments in the Mexican oil industry.

Humble Oil & Refining Co., Houston, Tex.
The economics involved in the processing of petroleum crude for useful products.

Kansas Engineering Society, Wichita, Kans.
Oil versus gas for domestic heating.

Los Angeles Gas and Electric Corporation, Box 1100, Station C., Los Angeles, Calif.
Odorization of natural gas.

Mid-Continent Oil and Gas Association, 308 Tulsa Building, Tulsa, Okla.
Causes of accidents.
Development of safe practices.

Minnesota Agricultural Experiment Station, University Farm, St. Paul, Minn.
Toxicity of insecticides.

Missouri School of Mines and Metallurgy, Department of Mining, Rolla, Mo.
Replacement of other fuels by natural gas.

Neville Chemical Co., Pittsburgh, Pa.
Toxicity of crude heavy solvent.

The Ohio Locomotive Crane Co., Bucyrus, Ohio.
Cost of operation using natural gas and oil for small rivet heating furnaces in comparison with electric-heated rivets.

State of Oklahoma (in cooperation with the United States Bureau of Mines), Oklahoma City, Okla.
Study of disposal of oil-field waters.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Effect of character of wire screens or gauzes in stopping flame in exploding gas-air mixtures.

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University of Pittsburgh, Department of Oil and Gas Production, Pittsburgh, Pa.
The age-size method of constructing composite oil-well production curves.
The loss-ratio method of extrapolating oil well production curves.
Empirical methods of determining optimum spacing of oil wells.
The pound-loss trend method of computing natural-gas reserves.

Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Effect of forced exhaust-gas dilution and methods of reducing carbon monoxide in exhaust gases.

Horace C. Porter, Consulting Chemist, 1833 Chestnut Street, Philadelphia, Pa.
Gas explosions.

Purdue University, Engineering Experiment Station (in cooperation with the Indiana Gas Association), Lafayette, Ind.
Comparative heating value of gas, oil, coal, and coke in house heating.

Foster D. Snell, 130 Clinton Street, Brooklyn, N. Y.
Maintaining of proper safety standards of mineral solvents as used in dry cleaning and related industries, before and after treatment for reuse by commercial methods.

United States Trust Co. of New York, 45 Wall Street, New York, N. Y.
Effect of increased consumption of natural gas on railroad traffic.
Effect on coal consumption of greater use of natural gas.

Standard Oil Co. (Ohio), Cleveland, Ohio.
General refinery safety.
Unproductive refining capacity for industry as a whole.
Unnecessary or uneconomic duplication of marketing facilities.
Economic disposition of heavy fuel oils at inland points.

Underwriters' Laboratories, 207 East Ohio Street, Chicago, Ill.
Flame arrest in vents of oil tanks.
Valves in vents of oil tanks, their capacity and dependability.
Fire hazard of petroleum products, including ignition and flash points, explosion pressure, and rate of flame propagation.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Safety work in Mid-Continent fields.

United States Bureau of Mines, Petroleum Experiment Station (in cooperation with the State of Oklahoma), Bartlesville, Okla.
Study of disposal of oil-field waters.

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United States Bureau of Mines, Petroleum Field Office, San Francisco, Calif.
Safety in refinery design.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Toxicity and physiological action of dichloro-difluoro-methane.
Toxicity and physiological action of dichloro-fluoro-methane.
Health hazards from aniline and dimethyl aniline.

United States Bureau of Standards, Washington, D. C.
Investigation of the safety and efficiency of utilization of gas.

United States Geological Survey, Washington, D. C.
Unitization of oil and gas fields.
Prevention of waste of oil and gas.
Computation of production curves for certain fields and states.
Preparation of mathematical tables for use in computation of production curves.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
Comparative costs of oil and coal heating in a residence.

Weiss and Downs (Inc.), 50 East 41st Street, New York, N. Y.
The economics of petroleum and natural-gas chemical derivatives.

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C. NONMETALLIC MINERALS AND PRODUCTS
(other than Coal (A), Petroleum, Natural Gas, and Asphalt (B))

I. Ceramic Raw Materials

AC Spark Plug Co., Flint, Mich.
Fundamental physical and chemical properties of clays and other non-metallic minerals.

Alfred University, New York State School of Clayworking and Ceramics, Alfred, N.Y.
The melting relations of the system potash feldspar - soda feldspar - quartz and the system potash feldspar - soda feldspar - muscovite mica.

American Chemical Products Co., 7 Litchfield Street, Rochester, N. Y.
Developing uses for complex acid and salt compounds of tungsten and molybdenum, such as phosphotungstic acid, sodium phosphotungstate, ammonium and sodium phosphotungstates, silicotungstic acid, sodium silicotungstate, ammonium and other silicotungstates, phosphomolybdic acid and ammonium, sodium and other phosphomolybdates in ceramics.

American Refractories Institute (in cooperation with the Mellon Institute of Industrial Research), 2218 Oliver Building, Pittsburgh, Pa.
The use in the refractories industry of various types of refractory clays, diaspore, magnesite, chromite, zircon, cyanite, and similar materials.

American Window Glass Co., Farmers' Bank Building, Pittsburgh, Pa.
Selection of correct clay for the specific purpose in glass manufacture.

Anaconda Lead Products Co., 151st and McCook Avenues, East Chicago, Ind.
Lead compounds for ceramic uses and glass making.

The Anthracite Institute (in cooperation with Lehigh University), 90 West Street, New York, N. Y.
The ceramic value of clays and shales associated with the Pennsylvania anthracite.

The Anthracite Institute (in cooperation with Pennsylvania State College), 90 West Street, New York; N. Y.
Suitability of waste products and shales associated with anthracite coals for production of ceramic products.

Bucknell University, Lewisburg, Pa.
The mechanical purification of refractory clays.

Champion Porcelain Co., 8525 Butler Avenue, Detroit, Mich.
Utilization of sillimanite, andalusite, cyanite, and dumortierite in ceramic and other products.

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Columbia University (in cooperation with the National Research Council and the United States Geological Survey), New York, N. Y.
Chemical, physical and optical analyses of clay minerals.

The Deister Concentrator Co., 901 Glasgow Avenue, Fort Wayne, Ind.
Separation and recovery of mica and kaolin.
Sizing of clay and shale by the use of vibrating screens.

The Dorr Co., 247 Park Avenue, New York, N. Y.
Clay bleaching.
Glass-sand purification.

The Eagle-Picher Lead Co., 134 North La Salle Street, Chicago, Ill.
Production of lead oxides (particularly litharge and red lead) and their use in the ceramic industries.

Edison General Electric Appliance Co. (Inc.), 5600 West Taylor Street, Chicago, Ill.
Electrical resistivity of fused, crushed, pure magnesium oxide at temperatures up to 2000° F.

University of Florida, College of Pharmacy, Department of Chemistry, Gainesville, Fla.
Chemical and physical tests on Florida clays.

Ford Motor Co., Dearborn, Mich.
Production of magnesia from dolomite.
Production of glass sand from lime-bonded sandstone.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Examination of and experimentation with mineral substances for use in ceramic products such as porcelain and vitreous enamels.

University of Illinois, Department of Ceramic Engineering, Urbana, Ill.
Investigation of the properties of feldspars.
Properties of spinels.

Illinois Wesleyan University, Bloomington, Ill.
Origin of sedimentary white clays.

Division of Geology, State Conservation Department, Indianapolis, Ind.
Origin of Indiana underclays and kaolin.

Iowa State College of Agriculture and Mechanic Arts, Iowa Engineering Experiment Station, Ames, Iowa.
Optimum oxidation temperatures for Iowa clays.

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Johns-Manville Corporation, Manville, N. J.
The processing of diatomaceous silica and the use of products made therefrom for heat and cold insulations.

Laclede-Christy Clay Products Co., 1711 Ambassador Building, St. Louis, Mo.
Selection and grading of fire clays in advance of mining.
Proper method of storing and reclaiming clays from various portions of a mine to assure uniform mixing.

Homer Laughlin China Co., Newell, W. Va.
Properties, mining and preparation of American clays, feldspar and quartz.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Utilization of shales and fire clays for various purposes.

Lehigh University, Department of Geology (in cooperation with the Anthracite Institute), Bethlehem, Pa.
The ceramic value of clays and shales associated with the Pennsylvania anthracite.

Mellon Institute of Industrial Research (in cooperation with the American Refractories Institute), Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
The use in the refractories industry of various types of refractory clays, diaspore, magnesite, chromite, zircon, cyanite, and similar materials.

Metal and Thermit Corporation, 120 Broadway, New York, N. Y.
Utilization of rutile and ilmenite.

Mississippi Valley Research Laboratory, Incorporated, 660 South 18th Street, St. Louis, Mo.
Elimination of iron and free silica from certain feldspar deposits.
Development of uses for unused Missouri clays.
Development of china clays from new sources.

Missouri School of Mines and Metallurgy, Department of Ceramic Engineering, Rolla, Mo.
The shape of clay grains as produced by various types of milling.
Mechanical weathering of clay.
A determination of the commercial value of high-iron and high-alkali diaspore.

Motor City Testing Laboratory (Inc.), 4410 Elmhurst Street, Detroit, Mich.
The use of different shales.

National Research Council, Division of Geology and Geography (in cooperation with the United States Geological Survey and Columbia University), B and 21st Streets, Washington, D. C.
Chemical, physical and optical analyses of clay minerals.

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University of Nebraska, Lincoln, Neb.
Prospecting for glass sand.
Location of clay of suitable composition in geographic locations accessible to the plants.

North Carolina State College of Agriculture and Engineering, Department of Ceramic Engineering, Raleigh, N. C.
Determination of the physical characteristics of the Triassic shales and clays of North Carolina.
Determining the burning range of pre-Cambrian and Brevard shales.
Substitution of Etowah buff clay for ball clay in ivory bodies.
Substitution of pyrophillite for clay in white bodies.
Determination of the physical characteristics of the larger alluvial clay deposits of North Carolina with special reference to the firing temperature at which the best color and properties are produced.

University of North Dakota, Division of Mines and Mining Experiments, University Station, Grand Forks, N. D.
Hydrogen ion - viscosity studies of North Dakota clay.
Survey of the clay deposits of North Dakota.
Tests of North Dakota clay for ceramic ware.

Ohio State University, Ceramic Engineering Department, Columbus, Ohio.
The properties of a group of commercial feldspars and their behavior in ceramic bodies.
Fusion study of the feldspar-kaolin-quartz system.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Processing and utilizing Lawrence (Ohio) fire clay.
Ceramic properties of Ohio shales.
Removal of pebbles from clays.
Field survey of shale and surface clay resources of Ohio and laboratory tests for physical and chemical characteristics.
A study of the ball clays used in tableware bodies.

Oklahoma Agricultural and Mechanical College (in cooperation with the Oklahoma Geological Survey), Stillwater, Okla.
Study of Oklahoma clays, including laboratory tests for the determination of quality.

Oklahoma Geological Survey (in cooperation with Oklahoma Agricultural and Mechanical College), Norman, Okla.
Study of Oklahoma clays, including occurrence and availability of deposits.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Filtration (for dewatering) of clay.

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Pennsylvania State College (in cooperation with the Anthracite Institute), State College, Pa.
Suitability of waste products and shales associated with anthracite coals for production of ceramic products.

Pennsylvania State College (in cooperation with the Pennsylvania State Geological Survey), State College, Pa.
Study of Pennsylvania clays.

Pennsylvania State Geological Survey (in cooperation with Pennsylvania State College), Harrisburg, Pa.
Study of Pennsylvania Clays.

Pittsburgh Plate Glass Co., Window Glass Research Department, Mt. Vernon, Ohio.
Study to permit control of materials for window glass with respect to purity, grain size, and constancy of composition.

The Porcelain Enamel and Manufacturing Co., Baltimore, Md.
The production and use of a cheaper grade of boric oxide-bearing minerals.
The elimination of coloring elements from minerals used for producing white enamels.

Rutgers University, Department of Ceramics, New Brunswick, N. J.
Utilization of the Triassic and Ordovician shales of New Jersey.
Utilization of rutile as a ceramic material.
Beneficiation of the plastic refractory clays of New Jersey.

Sierra Magnesite Co. (Ltd.), Newark, Calif.
Removal of silica from crude magnesite.
Production of artificial periclase in fuel-fired furnaces.
Production of high-purity magnesium oxide from crude magnesite.

University of South Carolina, Department of Geology, Columbia, S.C.
Prospecting and mining the kaolin deposits of South Carolina.

Stanford University, Stanford University, Calif.
The beneficiation of glass sands.
The concentration of andalusite.

Syracuse University, Syracuse, N. Y.
The albitization of original basic feldspar.

United States Bureau of Mines, Northwest Experiment Station (in cooperation with the University of Washington), Seattle, Wash.
Dewatering of clay suspensions.
Kaolins and feldspars of the Pacific Northwest.
The purification of kaolins by pneumatic methods.

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United States Bureau of Standards, Washington, D. C.
Phase equilibrium diagrams of systems composed of refractory oxides.
Preparation of Sagger clays in relation to their use.
Preparation of kaolins in relation to their utilization.
Preparation and beneficiation of fire clays for the production of refractories.
Development and improvement of methods for the chemical analysis of dolomite, limestone, feldspars, fluorspar, glass sand, phosphate rock, bauxite, and chromite.

United States Bureau of Standards (in cooperation with 12 industrial and private laboratories), Washington, D. C.
Analytical standards of chrome, magnesite, and silica materials used in refractories.

United States Geological Survey, Washington, D. C.
Regional studies of clay resources, including distribution, character, geological relationships, origin, and possible utility.
Identification of shales by ceramic methods.

United States Geological Survey (in cooperation with the National Research Council and Columbia University), Washington, D. C.
Chemical, physical and optical analyses of clay minerals.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Thermal expansion of refractory oxides.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research, Salt Lake City, Utah.
Removal of feldspar from quartz by flotation.

R. T. Vanderbilt Co. (Inc.), 230 Park Avenue, New York, N. Y.; Laboratories at 33 Winfield Street, East Norwalk, Conn.
Use of pyrophyllite in ceramic bodies.

Vitrefrax Corporation, 5050 Pacific Boulevard, Los Angeles, Calif.
Concentration of aluminum silicate minerals.
Stabilization of ceramic minerals.
Removal of specking impurities in ceramic minerals.
Heat treatment of ceramic minerals to alter crystalline form.

Washington and Jefferson College, Department of Chemistry, Washington, Pa.
Colloidal properties, particle size, reactions to reagents, and other properties of certain standard clays.

West Virginia University, Division of Industrial Sciences, Morgantown, W. Va.
Investigations of the properties of West Virginia clays.

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II. Heavy Clay Products and Refractories

American Face Brick Association (in cooperation with the United States Bureau of Standards, the National Lime Association, and manufacturers of masonry cements), 205 West Wacker Drive, Chicago, Ill.
Means of preventing moisture penetration of masonry walls.
The expansion and contraction of mortars and of bricks caused by change in moisture content and in temperature.

American Gas Association, Committee on Industrial Gas Research (in cooperation with Rutgers University), 420 Lexington Avenue, New York, N. Y.
Improving practices and efficiencies in the application of gas in the ceramics industry.

American Refractories Institute (in cooperation with the Mellon Institute of Industrial Research), Oliver Building, Pittsburgh, Pa.
Fellowship on refractories.

American Smelting & Refining Co., 120 Broadway, New York, N. Y.
Magnesite brick investigations.

American Society of Mechanical Engineers (in cooperation with the Battelle Memorial Institute), 29 West 39th Street, New York, N. Y.
Laboratory slag tests on various refractories.

American Society of Mechanical Engineers (in cooperation with the University of Illinois), 29 West 39th Street, New York, N. Y.
Development of slagging test for boiler-furnace refractories.

American Society of Mechanical Engineers (in cooperation with the United States Bureau of Standards), 29 West 39th Street, New York, N. Y.
Determination of the reactions and equilibria that underlie refractory failures in boiler furnaces.
Study of crystalline compounds formed in slags on boiler-furnace refractories.
The effects of reducing atmospheres on slag action on fire brick.

American Society for Testing Materials (in cooperation with Mellon Institute of Industrial Research), 1315 Spruce Street, Philadelphia, Pa.
Service spalling test of refractories.
Heat transfer in refractory materials.

American Society for Testing Materials (in cooperation with the Missouri School of Mines and Metallurgy), 1315 Spruce Street, Philadelphia, Pa.
P. C. E. test for refractories.

American Society for Testing Materials (in cooperation with Pennsylvania State College), 1315 Spruce Street, Philadelphia, Pa.
Abrasion of refractories at high temperatures.

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Atlas Lumnite Cement Co., 135 East 24th Street, New York, N. Y.
Properties of calcium aluminate cement in mortar and concrete for refractory uses.

The Babcock & Wilcox Co., 85 Liberty Street, New York, N. Y.
Development of high-temperature cements and plastics for use in furnaces.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Study of action of a series of coal ash slags on a series of special boiler-furnace refractories.

Battelle Memorial Institute (in cooperation with the American Society of Mechanical Engineers), 505 King Avenue, Columbus, Ohio.
Laboratory slag tests on various refractories.

Clay Products Association (in cooperation with the University of Illinois), 1847 Conway Building, 111 West Washington Street, Chicago, Ill.
Ceramic properties of flue lining, clay sewer pipe, and other materials.
Jointing materials for sewer pipe, flue lining, clay sewer pipe, and similar materials.
Utilization of clay for the manufacture of vitrified-clay sewer pipe.

Common Brick Manufacturers Association (in cooperation with Rensselaer Polytechnic Institute), 2121 Guarantee Building, Cleveland, Ohio.
Study of reinforced-brick work.

Common Brick Manufacturers Association (in cooperation with the United States Bureau of Standards), 2121 Guarantee Building, Cleveland, Ohio.
Compressive, tensile, and transverse strengths of brick and mortar compounds.
Survey of the physical properties of common brick manufactured in the United States.
Moisture transmission of brick walls.
Physical properties and performance of brick-masonry structures.

Corning Glass Works, Corning, N. Y.
Development of refractories for glass containers.

Electro Refractories Corporation, 66 Andrews Building, Buffalo, N. Y.
Development of refractory brick and cements from magnesite, aluminum and plastic clays, for use in ferrous and nonferrous foundries.

Ford Motor Co., Dearborn, Mich.
Production of magnesia from dolomite.
Production of high-alumina refractories.

General Refractories Co., 106 South 16th Street, Philadelphia, Pa.
Production of basic, neutral, and acid refractory materials.

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Gladding, McBean & Co., 2901 Los Feliz Boulevard, Los Angeles, Calif.
The development of refractories from aluminum silicate minerals, such as cyanite, andalusite and dumortierite.
The development of refractories from pure kaolin and kaolinite minerals.
The development of unglazed vitrified sewer pipe.
The development and application of a waterproofing compound to prevent scumming and efflorescence of clay wares after use in building.
The effect of synthetic potash minerals on the absorption and elimination of free quartz expansion in clay bodies.

Harbison-Walker Refractories Co., 1800 Farmers Bank Building, Pittsburgh, Pa.
The manufacture of refractories and the use of refractory materials such as fire clay, quartzite, magnesite, chrome, and diaspore.

Harrop Ceramic Service Co., 310 West Broad Street, Columbus, Ohio.
Drying, firing and glazing of ceramic products.

The Hoover Co., North Canton, Ohio.
Effect of ash composition on slagging of furnace refractories.

Robert W. Hunt Co., 166 West Van Buren Street, Chicago, Ill.
Cause of green spots on white facing brick.

University of Illinois, Department of Ceramic Engineering, Urbana, Ill.
Properties of spinels.
Drying of clay wares.
Resistance of some clay bodies to thermal shock.
Studies on oxidation of shale and fire-clay bodies.
Determination of manner in which destruction of fire brick proceeds in the fire box of power plant boilers.

University of Illinois (in cooperation with the American Society of Mechanical Engineers), Urbana, Ill.
Development of slagging test for boiler-furnace refractories.

University of Illinois (in cooperation with the Clay Products Association), Urbana, Ill.
Ceramic properties of flue lining, clay sewer pipe, and other materials.
Utilization of clay for the manufacture of vitrified-clay sewer pipe.
Jointing materials for sewer pipe, flue lining, clay sewer pipe, and similar materials.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
Making high-temperature cements from scrap refractories.

Johns-Manville Corporation, Manville, N. J.
The development and improvement of refractory cements to meet specific conditions.

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Laclede-Christy Clay Products Co., 1711 Ambassador Building, St. Louis, Mo.
Development of body mixtures for vitrified ware (sewer pipe).
Burning treatment to produce best salt glazes.
Development of dense, nonshrinking, nonspalling refractories.
Methods for the control of sizes of refractories.
Use of mineralizers in high-alumina products.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Preparation of roofing granules from shale and fire clays with simultaneous production of brick.
Preparation of brick of certain desired colors.
Study of glazes and colors in ceramic roofing tile.

Massachusetts Institute of Technology, Department of Physics, Cambridge, Mass.
Thermal conductivity of refractories at high temperatures.
Slag resistance of refractories at high temperatures.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Testing and properties of refractories.

Mellon Institute of Industrial Research (in cooperation with the American Refractories Institute), Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Fellowship on refractories.

Mellon Institute of Industrial Research (in cooperation with the American Society for Testing Materials), Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Service spalling test of refractories.
Heat transfer in refractory materials.

Missouri School of Mines and Metallurgy, Department of Ceramic Engineering, Rolla, Mo.
The effect of grog size on the dry-pressing characteristics of fire-clay mixes.
The heat-resisting qualities of high-temperature cements when subjected to various preheating treatments.
The manufacture of a super-refractory brick from an all hard flint-clay mix.
The effect of pressure, moisture, shape of grain and time of pressure application in the manufacture of dry-press fire brick.
The development of a dense surface refractory brick for use in acid vats, soda furnaces, and the like, using Missouri fire clay.
The application of colors to stiff-mud fire brick.
Bonding of anhydrite.
The volume changes which Missouri fire brick undergoes when subjected to various heat treatments.
Refractories made of mixtures of chrome and diaspore.
The effect of grog on pressure transmission in dry pressing.
The disintegration of green Missouri fire-clay bodies at low temperature.
The refractory qualities of mixtures of burley, flint, and plastic clays.
The development of an artificial substitute for firestone.
Miscellaneous dry-press problems.

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Missouri School of Mines and Metallurgy (in cooperation with the American Society for Testing Materials), Rolla, Mo.
P. C. E. test for refractories.

Missouri State Highway Department, Jefferson City, Mo.
The relative service rendered by culverts of corrugated metal pipe, vitrified-clay pipe, concrete pipe, and concrete boxes.

National Lime Association (in cooperation with the American Face Brick Association, the United States Bureau of Standards, and manufacturers of masonry cements), Washington, D. C.
Means of preventing moisture penetration of masonry walls.
The expansion and contraction of mortars and of bricks caused by change in moisture content and in temperature.

University of Nebraska, Lincoln, Neb.
Study of blending of clay.
Study of burning of clay products.

North Caolina State College of Agriculture and Engineering, Department of Ceramic Engineering, Raleigh, N. C.
Survey of structural clay products plants.
Investigation of North Carolina hollow tile.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Dry-pressed refractories.
Study of sewer pipe.
Salt-glazing problems.
Increase of porosity of stiff-mud brick.
Dry-pressing of paving brick.
Ceramic industries investigation.
Dissociation changes developed in various clays during process of firing.
Study of kiln design.
Heat conductivity of refractories.
A study of checker brick in the steel industry.
Structural-clay building tile for floor construction.
Tests of masonry pilasters.
The slag-pressing of refractories.
Engineering data on clay products and their use.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
The development of floor and wall tile bodies from Oklahoma clays.

Onondaga Pottery Co., Laboratory, 1858 West Fayette Street, Syracuse, N. Y.
Development of suitable refractories for chinaware manufacture.

Pennsylvania State College, School of Mineral Industries (in cooperation with the American Society for Testing Materials), State College, Pa.
Development of a standard test for resistance of refractories to abrasion at high temperatures.

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Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Comparative tests on heat transmission in refractories.

Rensselaer Polytechnic Institute, Troy, N. Y.
Refractory materials for cutting tools and dies.

Rensselaer Polytechnic Institute (in cooperation with the Common Brick Manufacturers Association of America), Troy, N. Y.
Study of reinforced-brick work.

Rose Polytechnic Institute, Terre Haute, Ind.
Design of dies for auger machines producing building tiles from center-point clay.
Study of drying and burning processes for center-point clay, including studies of loss of weight and shrinkage throughout the whole process with consequent changes in the time schedules and end points.

Rossman Corporation, Beaver Falls, Pa.
Floor and wall tile bodies and glazes.

Rutgers University (in cooperation with the American Gas Association), New Brunswick, N. J.
Improving practices and efficiencies in the application of gas in the ceramics industry.

Sierra Magnesite Co. (Ltd.), Newark, Calif.
Production of artificial periclase in fuel fired furnaces.
Production of refractories from artificial periclase.
Production of high purity magnesium oxide from crude magnesite.

Solidon Products (Inc.), Wolf and Water Streets, Philadelphia, Pa.
Preparation of magnesia cements.

United States Bureau of Standards, Washington, D. C.
Phase equilibrium diagrams of systems composed of refractory oxides.
Preparation of special refractories and refractory materials.
Properties of architectural terra cotta.
Thermal conductivity of refractories.

United States Bureau of Standards (in cooperation with the American Face Brick Association, the National Lime Association and manufacturers of masonry cement), Washington, D. C.
Means of preventing moisture penetration of masonry walls.
The expansion and contraction of mortars and of bricks caused by change in moisture content and in temperature.

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United States Bureau of Standards (in cooperation with the American Society of Mechanical Engineers), Washington, D. C.
Determination of the reactions and equilibria that underlie refractory failures in boiler furnaces.
Study of crystalline compounds formed in slags on boiler-furnace refractories.
The effects of reducing atmospheres on the slag action of fire-brick.

United States Bureau of Standards (in cooperation with the Common Brick Manufacturers Association), Washington, D. C.
Compressive, tensile, and transverse strengths of brick and mortar compounds.
Survey of the physical properties of common brick manufactured in the United States.
Moisture transmission of brick walls.
Physical properties and performance of brick-masonry structures.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Thermal expansion of refractory oxides.
Heat conductance of certain refractories.
Behavior of certain refractories in service.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
Thermal and electrical conductivities of refractories at high temperatures.

Wittenburg College, Department of Chemistry, Springfield, Ohio.
Preparation of dolomitic refractories.

III. Porcelain, Enamels, Glass and Electrical Insulators

Allen-Bradley Co., Milwaukee, Wis.
Utilization of clay and similar minerals for electrical insulation.

American Chemical Products Co., 7 Litchfield Street, Rochester, N. Y.
Use of selenium salts in the glass industry.

American Dental Association (in cooperation with the United States Bureau of Standards), 58 East Washington Street, Chicago, Ill.
Study of dental materials.

American Gas Association, Committee on Industrial Gas Research (in cooperation with Rutgers University), 420 Lexington Avenue, New York, N. Y.
Improving practices and efficiencies in the application of gas in the ceramics industry.

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American Society for Testing Materials (in cooperation with the Bell Telephone Laboratories, and the General Electric Co.), 1315 Spruce Street, Philadelphia, Pa.
Properties of electrical slate.

American Society for Testing Materials (in cooperation with the National Slate Association and the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Abrasive hardness of slate.

American Window Glass Co., Farmer's Bank Building, Pittsburgh, Pa.
Selection of correct clay for the specific purpose of glass manufacturing, and the development of the best process for making the clay of maximum utility.

Anaconda Lead Products Co., 151st and McCook Avenues, East Chicago, Ind.
Lead compounds for glass making.

Bailey & Sharp Co., Hamburg, N. Y.
Utilization of bismuth in glass.

Bell Telephone Laboratories (Inc.) (in cooperation with the American Society for Testing Materials and the General Electric Co.), New York, N. Y.
Properties of electrical slate.

C. G. Buchanan Chemical Co., Baker Avenue, Norwood, Cincinnati, Ohio.
Cleaning of glass for lacquering and decalcomania.

Condit Electrical Manufacturing Corporation, 1344 Hyde Park Avenue, Hyde Park, Mass.
Fibrous and ceramic insulating materials used in electrical apparatus and machinery, such as laminated, wound, or pressed phenolic materials, porcelain bushings and insulators.

Corning Glass Works, Corning, N. Y.
Development of glass to meet particular needs.
Development of refractories for glass containers.
Properties of glass of various compositions, including viscosity, density, expansion, and stability.
Control of raw batch materials entering into glass batches to insure a uniform glass product.
More effective utilization of gas, coal and oil in the manufacture of glass.

The Dorr Co., 247 Park Avenue, New York, N. Y.
Glass sand purification.

Duplate Corporation, Creighton, Pa.
Research on safety glass.

Ferro Enamel Corporation, Cleveland, Ohio.
Fundamental reactions involved in the manufacture of enamel.

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Ford Motor Co., Dearborn, Mich.
Production of glass sand from lime-bonded sandstone.

Fostoria Glass Co., Moundsville, W. Va.
Cerium glasses.
Selenium in glasses.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Making insulators of pure refractory oxides for vacuum tubes.
Examination of and experimentation with mineral substances for use in ceramic products such as porcelain and vitreous enamels.
Production and utilization of ceramic insulators and enamels.

General Electric Co. (in cooperation with the American Society for Testing Materials and the Bell Telephone Laboratories), 1 River Road, Schenectady, N.Y.
Properties of electrical slate.

Harrop Ceramic Service Co., 310 West Broad Street, Columbus, Ohio.
Drying, firing, and glazing of ceramic products.
Preparation of colored clay granules.

The Hazel-Atlas Glass Co., Clarksburg, W. Va.
A cheap decolorizer for glass carrying over 0.10 Fe_2O_3.
A reliable breakage test for glassware used in hot processing.

University of Illinois, Department of Ceramic Engineering, Urbana, Ill.
Electrical porcelain investigation.
Effect of atmospheric conditions on cast-iron and sheet-steel enamels in melting and firing.
Nature of opacifiers in enamels as shown by X-ray studies.
Effect of body composition on development of salt glazes.
Microscopic studies of porcelain glazes.

University of Illinois (in cooperation with the Utilities Research Commission (Inc.)), Urbana, Ill.
High voltage porcelain insulators.

Lafayette College, Department of Electrical Engineering, Easton, Pa.
Tests of slate for electrical purposes.

Lapp Insulator Co., Le Roy, N. Y.
Tests of electrical porcelain bodies and clays.
Tests of firing in tunnel kiln.
Tests of strength of insulating materials.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Study of ceramic finishes and their preparation for use on sanitary ware.
Development of single-coat enamel for enamel ware.

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McGean Chemical Co., Keith Building, Cleveland, Ohio.
Development of vitreous enamels.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Production problems in the manufacture of glass.
Problems in the production of insulating glass.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Transmission and diffusion of light by glass.

National Slate Association (in cooperation with the American Society for Testing Materials and the United States Bureau of Standards), Drexel Building, Philadelphia, Pa.
Abrasive hardness of slate.

University of Nebraska, Lincoln, Neb.
Prospecting for glass sand.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
A fundamental study of vitreous enamels.

Onondaga Pottery Co., Laboratory, 1858 West Fayette Street, Syracuse, N. Y.
Production of improved type of chinaware.
Effecting economies in chinaware manufacture.

The Pfeudler Co., 89 East Avenue, Rochester, N. Y.
Research on vitreous linings for steel equipment.

Pittsburgh Plate Glass Co., Window Glass Research Department, Mt. Vernon, Ohio.
Study of desirable temperature for melting and fabricating window glass.
Study to permit control of materials for window glass with respect to purity, grain size, and constancy of composition.

Louis G. Robinson Laboratories, 21 East 4th Street, Cincinnati, Ohio.
Development of acid-resisting enamels.

Rundle Manufacturing Co., Milwaukee, Wis.
Dry process cast-iron enameling.

Rutgers University (in cooperation with the American Gas Association), New Brunswick, N. J.
Improving practices and efficiencies in the application of gas in the ceramics industry.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Suspension of suitable glass-insoluble abrasives in molten glass in the manufacture of abrasive glass.

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Splitdorf Electrical Co., Newark, N. J.
Electrical porcelain and glazes therefor, resistant to high temperature.
Mineral-insulating compounds adapted to commercial moulding.

Stackpole Carbon Co., Tannery Street, St. Marys, Pa.
Development and perfection of nonmetallic high-resistance units for radio work.

Stanford University, Stanford University, Calif.
The beneficiation of glass sands.

United States Bureau of Standards, Washington, D. C.
Effect of high temperatures on micas.
Problems relating to the manufacture of optical glass.
Factors affecting the crazing of semiporcelain dinner ware.
The physical properties of vitreous china bodies fired at different temperatures.
Development and improvement of methods for the chemical analysis of glass sand.

United States Bureau of Standards (in cooperation with the American Dental Association), Washington, D. C.
Study of dental materials.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials and the National Slate Association), Washington, D. C.
Abrasive hardness of slate.

Utilities Research Commission (Inc.) (in cooperation with the University of Illinois), Room 522, 72 West Adams Street, Chicago, Ill.
High-voltage porcelain insulators.

R. T. Vanderbilt Co. (Inc.), 230 Park Avenue, New York, N. Y., Laboratory at 33 Winfield Street, East Norwalk, Conn.
Use of pyrophyllite in ceramic bodies.
Use of cerium oxide to make yellow glass.

Vitrefrax Corporation, 5050 Pacific Boulevard, Los Angeles, Calif.
Development of long-range ceramic fluxes.

Wayne Laboratories, 17 East Main Street, Waynesboro, Pa.
Development of permanent colors on rock granules by a firing process and by coating the granules.

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IV. Porous Ceramic Products, Heat Insulators, and Asbestos

American Society of Heating and Ventilating Engineers, Research Laboratory (in cooperation with the University of Minnesota), 4800 Forbes Street, Pittsburg Pa.
Heat transmission through various types of building construction.

American Solvents and Chemical Corporation, 122 East 42nd Street, New York, N.Y
85 per cent magnesia and other heat insulating materials.

Armour Institute of Technology, Mechanical Engineering Department, Chicago, Ill
Heat transmission through building materials, insulating materials, pipe coverings and refractories.

Armstrong Cork Co., Lancaster, Pa.
The utilization of clays, diatomaceous earth, and asbestos in the production of thermal insulating materials.

Brown University, Division of Engineering, Providence, R. I.
Investigation of insulating properties of certain materials.

C. F. Burgess Laboratories (Inc.), 1011 East Washington Avenue, Madison, Wis.
Development of porous and light-weight ceramic products.

Philip Carey Co. (in cooperation with the Mellon Institute of Industrial Research), Lockland, Ohio.
Fellowship on heat insulation.

Dewey & Almy Chemical Co., 235 Harvey Street, North Cambridge, Mass.
Grading of asbestos.
Freeing of asbestos from grit.
Asbestos as a friction element.

Gladding, McBean & Co., 2901 Los Feliz Boulevard, Los Angeles, Calif.
Study of porous burned-clay bodies.

Johns-Manville Corporation (Celite Corporation), Lompoc, Calif.
The development of methods for prospecting, mining, quarrying, and stripping deposits of diatomaceous silica in Santa Barbara County, Cali
The transportation and processing of diatomaceous silica.

Johns-Manville Corporation, Manville, N. J.
The development of light-weight ceramic products for heat and sound insulation.
The processing of diatomaceous silica and the use of products made therefrom for heat and cold insulations.

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University of Kentucky, Department of Mines and Metallurgy, Lexington, Ky.
A study of vermiculite, with especial reference to its economic applications.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Utilization of nonmetallic materials in heat insulation.

Mellon Institute of Industrial Research (in cooperation with the Philip Carey Co.), Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Fellowship on heat insulation.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Studies of the use of asbestos in gaskets.

University of Minnesota, Experimental Engineering Laboratories, Minneapolis, Minn.
Determination of the laws governing heat flow through built-up wall sections and insulating materials.

University of Minnesota (in cooperation with the American Society of Heating and Ventilating Engineers), Minneapolis, Minn.
Heat transmission through various types of building construction.

Missouri School of Mines and Metallurgy, Department of Ceramic Engineering, Rolla, Mo.
Development of a high-temperature insulating brick with the use of metals and acids.

Monmouth College, Department of Physics and Geology, Monmouth, Ill.
High-temperature heat insulators.
Plasticization of pure silica.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Development of porous ceramic material.
Developing cellular clay products.

Pennsylvania State College, State College, Pa.
Heat transmission through building materials.

Raybestos-Manhattan (Inc.), Raybestos Division, Bridgeport, Conn.
Manufacture of asbestos products from crude asbestos and fibres.

The Russell Manufacturing Co. (Inc.), Middletown, Conn.
Use of asbestos in textiles.

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V. Lime, Gypsum and Plaster

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
- Consistency of gypsum plaster.
- Time of set of gypsum neat plaster.
- Sand content of set gypsum plaster.
- Volume changes in neat gypsum and gypsum-fiber concrete.
- Properties of gypsum-fiber concrete.

California Chemical Corporation, Newark, Calif.
- Preparation and properties of lime from San Francisco Bay oyster shells.

Certain-teed Products Corporation, 100 East 42nd Street, New York, N. Y.
- Utilization of gypsum, calcined gypsum, and their manufactured products.
- Improvement of the qualities of finished gypsum products.
- Improvements of processes for gypsum fabrication.
- Research on raw materials and equipment for making gypsum products.

Cosma Laboratories Co., 1545 East 18th Street, Cleveland, Ohio.
- Development of sound absorbing plaster.

The Haden Lime Co., 1720 Shepherd Street, Houston, Tex.
- Removal of mechanically contained impurities from raw material fed to rotary limekilns.
- Proper size, or gradation of sizes, of raw material to give best results in rotary limekilns.
- Effects of different burning conditions upon properties of lime produced by rotary kilns.
- Effects of properties of quicklime upon the properties of hydrates made from it.
- Effects of different conditions of hydration upon the properties of hydrated limes made from a given grade of quicklime.
- Effects of varying amounts of excess moisture in raw hydrates upon efficiency of milling operations employed to produce finished hydrates and upon the properties of the finished hydrates.

Harrop Ceramic Service Co., 310 West Broad Street, Columbus, Ohio.
- Use of natural gas for firing lime.

University of Illinois, Agricultural Experiment Station, Urbana, Ill.
- Liming materials for use on Illinois soils.
- Relation of soil calcium and magnesium in their different chemical combinations to lime requirement and to hydrogen-ion concentration of the soil, and the movement of these elements in limed and unlimed land.
- Effectiveness of lime and limestone on soils of Illinois.
- Soil acidity and distribution of calcium and magnesium in the horizons of limed and unlimed soils.
- Factors influencing the effectiveness of limestone when used on Illinois soils.

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University of Maryland, Agricultural Experiment Station, College Park, Md.
Phosphates, potash, sulphur, lime, boron and other chemicals as plant foods.

Massachusetts Agricultural College, Experiment Station, Amherst, Mass.
Use of potash and lime in fertilizers.

The Mead Corporation, Chillicothe, Ohio.
Utilization of waste lime from the causticizing of alkaline liquors, especially the production of a precipitate suitable for coating paper or as a filler for paper.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Volume changes in gypsum structures due to atmospheric humidity.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Chemical study of commercial lime.

Oklahoma Agricultural Experiment Station, Stillwater, Okla.
The effect of fineness of division and of different amounts of limestone on the growth of alfalfa and other legumes when grown on soils of different degrees of acidity.

Oregon Agricultural Experiment Station, Soils Department, Corvallis, Oreg.
Use of ground limestone for correcting soil acidity.
Use of land-plaster and sulphur as a fertilizer material.
The use of land-plaster and sulphur as a soil amendment on alkali soils.

Pennsylvania Agricultural Experiment Station, State College, Pa.
The value of blast furnace slag as a source of agricultural lime.

Rhode Island Agricultural Experiment Station, Kingston, R. I.
Use of lime for plant growth.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Use of fertilizers including phosphates, limestones, marls, potash minerals, nitrates, sulphur, and ammonium salts.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Methods for the most satisfactory slacking of burnt lime and for improving it for use in mortar or plaster by rendering it quicker-setting and less porous.
The reduction of suction in plasters.
Precast building material from magnesite in imitation of the surface texture and appearance of travertine.

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Structural Gypsum Corporation, Linden, N. J.
Fundamental properties of gypsum.
Development of new products from gypsum.
Improvement of present gypsum products.

United States Bureau of Mines, Nonmetallic Minerals Experiment Station (in cooperation with Rutgers University), New Brunswick, N. J.
Fundamental factors involved in the utilization of gypsum and anhydrite for cement retardation.

United States Bureau of Standards, Washington, D. C.
Determination of the particle-size distribution of hydrated lime.
Determination of the soundness of lime.
Freezing and thawing tests on sand-lime brick.
The burning of a chalk containing diatomaceous silica for the production of an hydraulic lime.
Volumetric changes of gypsum-fiber concrete.
Heat of solution of calcium sulphate.

United States Geological Survey, Washington, D. C.
Regional studies, distribution, character, amount, and geological relations of gypsum.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
Effect of storage on hydrated lime.
Comparative efficiency of various cements and lime in mortars.

Warner Co., 1616 Walnut Street, Philadelphia, Pa.
Quick-set plaster with lime base.
Plastic hydrate from a normally nonplastic lime.

Weld and Liddell, 75 West Street, New York, N. Y.
Production of magnesite plastics.

University of Wisconsin, Agricultural Experiment Station, Madison, Wis.
The value of lime phosphate as a fertilizer.

VI. Cement and Concrete (including aggregates)

University of Alabama, University, Ala.
Determination of temperatures occurring in concrete after placing.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Efficient grinding of cement-making materials, Portland-cement clinker, and other materials.
Determination of optimum particle size of Portland cement.

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American Association of State Highway Officials (in cooperation with the Missouri State Highway Department), National Press Building, Washington, D.C.
Standardization of method for determining flexural strength of plain concrete.

American Concrete Institute, 624 Fisher Building, Detroit, Mich.
The fundamental relationships between load, elastic properties and ultimate strength of reinforced-concrete columns as influenced by variations in size, quality of concrete, curing of concrete, amount, arrangement and quality of reinforcement, fireproofing, rate and method of loading, and the effect of continuous loading over long periods of time.

American Society of Civil Engineers (in cooperation with the American Society for Testing Materials and the Iowa State Highway Commission), 33 West 39th Street, New York, N. Y.
Comparative strength tests of cement.

American Society of Civil Engineers (in cooperation with the Engineering Foundation, the University of Illinois, the Ohio State University, and the United States Bureau of Public Roads), 33 West 39th Street, New York, N. Y.
Concrete and reinforced-concrete arches.

American Society of Heating and Ventilating Engineers, Research Laboratory, 4800 Forbes Street, Pittsburgh, Pa.
Effect of aging on conductivity of concrete.

American Society for Testing Materials (in cooperation with the American Society of Civil Engineers and the Iowa State Highway Commission), 1315 Spruce Street, Philadelphia, Pa.
Comparative strength tests of cement.

American Society for Testing Materials (in cooperation with the Ash Grove Lime and Portland Cement Co., and the Kansas State Agricultural College), 1315 Spruce Street, Philadelphia, Pa.
Permeability tests of concrete.

American Society for Testing Materials (in cooperation with the University of California), 1315 Spruce Street, Philadelphia, Pa.
Standard method of test for determining volume changes in concrete, and effect of volume changes upon the durability of concrete.

American Society for Testing Materials (in cooperation with the France Stone Co., the Ohio State Highway Department, and the United States Bureau of Public Roads), 1315 Spruce Street, Philadelphia, Pa.
Abrasion of aggregates.

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American Society for Testing Materials (in cooperation with the University of Illinois, the Port of New York Authority, and the United States Bureau of Public Roads), 1315 Spruce Street, Philadelphia, Pa.
Quality of concrete for bridge floor slabs, with special reference to the use of light-weight aggregates.

American Society for Testing Materials (in cooperation with the Indiana State Highway Commission), 1315 Spruce Street, Philadelphia, Pa.
Effect of oil-bearing aggregates on concrete.

American Society for Testing Materials (in cooperation with the Iowa State College of Agriculture and Mechanic Arts, Lehigh University, Portland Cement Association and the Tennessee State Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Investigation of the accuracy and practicability of various proposed methods of measuring the constituents of fresh concrete.

American Society for Testing Materials (in cooperation with Iowa State College of Agriculture and Mechanic Arts, and the Tennessee State Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Uniformity of apparent specific gravity of fine and coarse aggregate from same deposit.

American Society for Testing Materials (in cooperation with the Iowa State Highway Commission, the Kansas State Agricultural College, and the Minnesota Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Effect of rate of freezing for freezing and thawing tests of aggregates.

American Society for Testing Materials (in cooperation with the Iowa State Highway Commission, the Kansas State Agricultural College, the National Crushed Stone Association, the National Sand and Gravel Association, the New York State Highway Commission, the Portland Cement Association, and the United States Bureau of Public Roads), 1315 Spruce Street, Philadelphia, Pa.
Soundness of aggregate.

American Society for Testing Materials (in cooperation with the Johns-Manville Corporation and the Portland Cement Association), 1315 Spruce Street, Philadelphia, Pa.
Workability of concrete.

American Society for Testing Materials (in cooperation with the Kansas State Agricultural College), 1315 Spruce Street, Philadelphia, Pa.
Laboratory tests of the probable cause of failure of concrete.
Volume changes in concrete made with high-early-strength and standard Portland cements.

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American Society for Testing Materials (in cooperation with the National Crushed Stone Association, the National Slag Association, and the National Sand and Gravel Association), 1315 Spruce Street, Philadelphia, Pa.
Suitability of stone sand, slag sand, and crushed-gravel sand for use as fine aggregate in concrete.

American Society for Testing Materials (in cooperation with the New Hampshire Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Studies of workability of concrete contributing to the formation of specifications for aggregates.

American Society for Testing Materials (in cooperation with the New Jersey State Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Comparison of different methods of testing concrete sands to secure a standard method.

American Society for Testing Materials (in cooperation with the Oregon Agricultural College), 1315 Spruce Street, Philadelphia, Pa.
Study of various recommended methods for determining moisture content in concrete aggregate.

American Society for Testing Materials (in cooperation with the Portland Cement Association), 1315 Spruce Street, Philadelphia, Pa.
Durability of concrete in relation to compressive strength, different water-cement ratios, and consistencies.
Development of methods of tests for measuring the durability of concrete.

American Society for Testing Materials (in cooperation with the Tennessee State Highway Department), 1315 Spruce Street, Philadelphia, Pa.
Method for determining the apparent specific gravity of coarse aggregate.

American Society for Testing Materials (in cooperation with the United States Bureau of Public Roads), 1315 Spruce Street, Philadelphia, Pa.
Effect of moisture conditions at test on stress-strain relation for concrete in compression and flexure.
Proposed alternate method of mortar test for sand for use in fine aggregate.
Standardization method for the determination of flexural strength of concrete.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Weathering characteristics of concrete.

Ash Grove Lime and Portland Cement Co. (in cooperation with the American Society for Testing Materials and the Kansas State Agricultural College), Chanute, Kans.
Permeability tests of concrete.

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Atlas Lummite Cement Co., 135 East 42nd Street, New York, N. Y.
Properties of calcium aluminate cement in mortar and concrete, in concrete construction, in resistance to corrosive action of alkaline sulphate solutions, and for refractory uses.

Babcock & Wilcox Co., 85 Liberty Street, New York, N. Y.
Development of high temperature cements and plastics for use in furnaces.

Birmingham-Southern College, Department of Chemistry, Birmingham, Ala.
Relation of composition and fineness to the properties of blast furnace slag cements.
Physical and chemical properties of puzzolanic cements.

Calcium Chloride Association (in cooperation with Ohio State University), 61 Broadway, New York, N. Y.
The effect of calcium chloride as a curing agent for Portland-cement concrete.
Effect of calcium chloride on hydration of minerals.

California Agricultural Experiment Station, Davis, Calif.
Comparative field and accelerated use tests of fence posts made from steel, wood treated with various preservatives, and concrete of various mixtures, reinforcing, and methods of wire fastening.

California Division of Highways, Sacramento, Calif.
Effect of additions of various commercial powders on the properties of cement mortars and concretes.
Effect of copper sulphate on asphalt and asphalt-concrete mixtures.
Efficacy of various methods of curing concrete pavements.
The expansion and contraction of concrete pavements.
Hydration and causes of disintegration of concrete.
Investigation of strengths of different brands of cements.
Permissible tolerance of soft rock in concrete coarse aggregate.

University of California, Berkeley, Calif.
Comparison of compressive strength and modulus of rupture.
Effect of high-curing temperature on strength of concrete.
Effect of jigging during setting on compressive strength of concrete.
Effect of moisture on strength and modulus of elasticity of concrete.
Effect of size of cylinder on strength of concrete.
Effect of temperature at time of test on strength of concrete.
Flexural strength of brick and tile masonry beams using a variety of cement-lime mortars.
Permeability of concrete.
Thermal expansion of concrete.
Volume changes in concrete due to changes in moisture conditions.

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University of California, Department of Mining and Metallurgy, Berkeley, Calif.
The effects of pressure, temperature, and dilution on the setting properties and strength of oil-well cements.

University of California (in cooperation with the Engineering Foundation), Berkeley, Calif.
Plastic flow of concrete under continued stress.

University of California, College of Civil Engineering (in cooperation with the American Society for Testing Materials), Berkeley, Calif.
Standard method of test for determining volume changes in concrete, and effect of volume changes upon the durability of concrete.

The Citadel, The Military College of South Carolina, Charleston, S. C.
Effect of diatomaceous silica on the water-cement ratio of concrete.

University of Colorado, Boulder, Colo.
Effect of removing water that gathers at the top of the mortar or concrete soon after placing.
Effect of size of cylinder on strength of concrete and mortars.
Effect of stressing steel encased in concrete above its yield point.
Effect of crusher dust on the strength and other properties of mortars and concretes made from crushed granite.
Effect of colloidal clay in sand on its usefulness as a fine aggregate for concrete.
Well-graded washed sand versus crushed granite screenings as fine aggregates for concrete.
Celite as an admixture in concrete.

University of Colorado (in cooperation with the United States Bureau of Reclamation and the Engineering Foundation), Boulder, Colo.
Rates of evaporation and absorption of mortar and concrete specimens of different sizes and shapes.
Flow of concrete under continuous compressive, flexural, and tensile stress.
Modulus of elasticity and Poisson's ratio of concrete.
Modulus of elasticity in tension, torsion, and flexure of concrete.
Volume changes in concrete due to changes in moisture conditions.

Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
Effect on concrete of acid water from stored bituminous coal.

Hugh L. Cooper & Co. (Inc.) (in cooperation with the United States Bureau of Standards), 101 Park Avenue, New York, N. Y.
Effect of clays in concrete.

Coplay Cement Manufacturing Co., Coplay, Pa.
Burning and grinding problems in the manufacture of Portland cement.

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Delaware, Lackawanna & Western Railway Co., Hoboken, N. J.
Effect of admixtures on concrete.

Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Effect of sulphur water on concrete.
Oilproofing concrete.

Engineering Foundation (in cooperation with the American Society of Civil Engineers, the University of Illinois, the Ohio State University, and the United States Bureau of Public Roads), 29 West 39th Street, New York, N. Y.
Concrete and reinforced-concrete arches.

Engineering Foundation (in cooperation with the University of California), 29 West 39th Street, New York, N. Y.
Plastic flow of concrete under continued stress.

Engineering Foundation, Arch Dam Committee (in cooperation with the United States Bureau of Reclamation and the University of Colorado), 29 West 39th Street, New York, N. Y.
Rates of evaporation and absorption of mortar and concrete specimens of different sizes and shapes.
Flow of concrete under continuous compressive, flexural, and tensile stress.
Modulus of elasticity and Poisson's ratio of concrete.
Modulus of elasticity in tension, torsion, and flexure of concrete.
Volume changes in concrete due to changes in moisture conditions.

France Stone Co. (in cooperation with the American Society for Testing Materials and others), 816 Summit Street, Toledo, Ohio.
Abrasion of aggregates.

Georgia State Highway Department, Atlanta, Ga.
Internal stress and longitudinal movement of concrete paving.

Illinois State Highway Department, Springfield, Ill.
A comparison of the strength making properties of 14 brands of standard Portland cement used in the construction of highways in Illinois.
The effect of various percentages of different powdered admixtures upon the strength and workability of concrete.
The weather-resisting qualities of concrete in which different percentages of chert were used as a coarse aggregate.

University of Illinois, Urbana, Ill.
Bond resistance of reinforced concrete beams under continued load.

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University of Illinois (in cooperation with the American Society of Civil Engineers, the Engineering Foundation and others), Urbana, Ill.
Concrete and reinforced-concrete arches.

University of Illinois (in cooperation with the American Society for Testing Materials and others), Urbana, Ill.
Quality of concrete for bridge floor slabs, with special reference to the use of light-weight aggregates.

Indiana State Highway Commission, Indianapolis, Ind.
Cracking and surface conditions of Portland-cement concrete pavements of various types and ages.

Indiana State Highway Commission (in cooperation with the American Society for Testing Materials), Indianapolis, Ind.
Effect of oil-bearing aggregates on concrete.

International Cement Corporation, 342 Madison Avenue, New York, N. Y.
Effect of temperature environment on strength and other properties of concrete made from high-early-strength Portland cement.
Properties of concrete consolidated under high pressure.
Effect of compound composition on manufacture and properties of Portland cemant and high-early-strength Portland cement.
Factors affecting workability of concrete mixtures.
Concrete-making properties of high-early-strength Portland cements.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
Making high-temperature cements from scrap refractories.
Methods of rendering concrete drain tile resistant to alkali attack.

Iowa State College of Agriculture and Mechanic Arts, Department of Civil Engineering (in cooperation with the American Society for Testing Materials and others), Ames, Iowa.
Uniformity of apparent specific gravity of fine and coarse aggregate from same deposit.
Investigation of the accuracy and practicability of various proposed methods of measuring the constituents of fresh concrete.

Iowa State Highway Commission, Laboratory, Ames, Iowa.
Determination of the causes of flash setting or early stiffening of otherwise apparently normal Portland cements.
Development of a new strength test for sand for concrete aggregate.
Effect on the strength and durability of concrete of the use of relatively soft limestone as coarse aggregate.
The effect upon the strength and durability of concrete of calcium chloride solution used in the fabrication of the concrete.
Effect of type of transverse-testing machine on modulus of rupture of concrete.

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Iowa State Highway Commission - Continued.
The effects of various commercial admixtures in concrete.
Elastic properties of concrete.
Fatigue tests on concrete.
Investigation of the behavior of different types of stone when subjected to each of several variations of the sodium sulphate soundness test.
Methods of curing concrete.
Thermal coefficient of expansion of concrete.
Waterproofing concrete.

Iowa State Highway Commission, Laboratory, Mason City, Iowa.
Effects of moisture conditions of subgrade upon rate and extent of moisture loss from plastic concrete.

Iowa State Highway Commission (in cooperation with the American Society for Testing Materials and others), Ames, Iowa.
Effect of rate of freezing for freezing and thawing tests of aggregates.
Soundness of aggregates.

Iowa State Highway Commission, Department of Materials and Tests (in cooperation with the American Society for Testing Materials and the American Society of Civil Engineers), Ames, Iowa.
Comparative strength tests of cement.

Johns-Manville Corporation, Manville, N. J.
Research in the processing of diatomaceous silica and in the use of products made therefrom for concrete admixtures.
The development and improvement of refractory cements to meet specific conditions.

Johns-Manville Corporation (in cooperation with the American Society for Testing Materials and the Portland Cement Association), Manville, N. J.
Workability of concrete.

Johns-Manville Corporation (in cooperation with the Pierce Testing Laboratories), Manville, N. J.
Permeability tests of concrete with and without admixtures of celite.

Kansas City Testing Laboratory, 700 Baltimore Avenue, Kansas City, Mo.
Preparation of light-weight aggregates for concrete.

Kansas State Agricultural College, Manhattan, Kans.
The effect of porosity on durability of concrete.
Causes of deterioration of Portland-cement concrete when exposed to action of ensilage liquors and development of methods of overcoming and preventing such deterioration.

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Kansas State Agricultural College, Engineering Experiment Station, Manhattan, Kans.
Short-time strength tests for sands for concrete.
Use of sand as total aggregate for concrete.
Durability of aggregates in concrete.

Kansas State Agricultural College (in cooperation with the National Research Council), Manhattan, Kans.
Volume changes in concrete.

Kansas State Agricultural College, Engineering Experiment Station (in cooperation with the Kansas State Highway Commission), Manhattan, Kans.
Factors affecting change in volume or length of concrete specimens.
The characteristics and concrete-making qualities of sands from various commercial sources in Kansas.
Characteristics of 14 brands of standard Portland cement and four early-strength cements as shown by their chemical analyses, time of set, normal consistency, specific gravity, fineness, tensile strength of mortars, and compressive tests on a 1:1.8:3.2 mix of concrete (by volume).
Determination of the proper methods for measuring the resistance of concrete and concrete aggregates to weathering and alkali action, particularly freezing and thawing.
Investigations of the effect of various aggregates and other variables on the moduli of elasticity of concrete and Poisson's ratio.
Moisture content of concrete.
The temperature of concrete at various depths in freshly laid pavement, under various curing conditions.

Kansas State Agricultural College, Road Materials Laboratory (in cooperation with the American Society for Testing Materials), Manhattan, Kans.
Laboratory tests of the probable cause of failure of concrete.
Volume changes in concrete made with high-early-strength and standard Portland cements.

Kansas State Agricultural College, Road Materials Laboratory (in cooperation with the American Society for Testing Materials and the Ash Grove Lime and Portland Cement Co.), Manhattan, Kans.
Permeability tests of concrete.

Kansas State Agricultural College, Road Materials Laboratory (in cooperation with the American Society for Testing Materials and others), Manhattan, Kans.
Effect of rate of freezing for freezing and thawing tests of aggregates.
Soundness of aggregate.

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Kansas State Highway Commission (in cooperation with the Kansas State Agricultural College), Topeka, Kans.
- Factors affecting change in volume or length of concrete specimens.
- The characteristics and concrete-making qualities of sands from various commercial sources in Kansas.
- Characteristics of 14 brands of standard Portland cement and four early-strength cements as shown by their chemical analyses, time of set, normal consistency, specific gravity, fineness, tensile strength of mortars, and compressive tests on a 1:1.8:3.2 mix of concrete (by volume).
- Determination of the proper methods for measuring the resistance of concrete and concrete aggregates to weathering and alkali action, particularly freezing and thawing.
- Investigations of the effect of various aggregates and other variables on the modulus of elasticity of concrete and Poisson's ratio.
- Moisture content of concrete.
- The temperature of concrete at various depths in freshly laid pavement, under various curing conditions.

Kentucky State Highway Department, Frankfort, Ky.
- Causes and preventions of hair cracking in concrete pavement.

Kentucky State highway Department (in cooperation with the University of Kentucky), Frankfort, Ky.
- Curing concrete pavements.
- Relationship between transverse and compressive strength of concrete.
- Variations in strength of concrete cylinders due to rodding.
- Relationship between cement factor and wear and strength of concrete.
- Effect on concrete of mixing coarse screenings with sand which does not meet specifications.
- Durability of concrete made from unsound stone.
- Sandstone as aggregate in concrete.
- Method of testing stability of sandstone for concrete construction.

University of Kentucky (in cooperation with the Kentucky State Highway Department), Lexington, Ky.
- Curing concrete pavements.
- Relationship between transverse and compressive strength of concrete.
- Variations in strength of concrete cylinders due to rodding.
- Effect on concrete of mixing coarse screenings with sand which does not meet specifications.
- Durability of concrete made from unsound stone.
- Sandstone as aggregate in concrete.
- Method of testing stability of sandstone for concrete construction.
- Relationship between cement factor and wear and strength of concrete.

Lapp Insulator Co., LeRoy, N. Y.
- Tests of Portland cement.

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Lehigh Portland Cement Co., Young Building, Allentown, Pa.
Development of a low-priced damp closet for cement testing.
Effect of coal ash on Portland-cement composition.
Volume changes of neat cements.

Lehigh University (in cooperation with the American Society for Testing Materials), Bethlehem, Pa.
Investigation of the accuracy and practicability of various proposed methods of measuring the constituents of fresh concrete.

Lehigh University, Department of Geology (in cooperation with the Pennsylvania Geological Survey, cement companies, and other limestone users), Bethlehem, Pa.
The occurrence, structural features, origin, utilization and economics of the Pennsylvania limestones of economic importance.

Louisville Cement Corporation of Indiana, Speed, Ind.
Characteristics and properties of natural cements and products made therefrom.
Effect of Portland-cement admixtures with natural cements.
Physical and chemical condition of raw materials and their effect on the resultant Portland cement.
Plasticity of cements and conditions affecting it.

Maine State Highway Department, Orono, Me.
Determination of the hardness of sand by a wear test and the durability of sand by daily alternate freezing and thawing of mortar specimens.
Determination of a unit working stress for hooked reinforcing steel for concrete.

Maine Technology Experiment Station, Orono, Me.
Hydrogen ion content of sands in relation to their use in concrete.

Maryland State Roads Commission (in cooperation with the United States Bureau of Public Roads), Annapolis, Md.
The suitability of various materials for resurfacing old concrete pavements.
Comparative study of wet earth, calcium chloride, and sodium silicate for curing concrete pavements.

Massachusetts State Highway Department, Boston, Mass.
Comparison of strength of concrete cylinders made at the laboratory with concrete cylinders made in the field.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Portland cement fellowship.
The upper SO_3 limit in Portland cement.

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Michigan State Highway Department, Laboratory, Lansing, Mich.
Effect of soft particles of coarse aggregate on the strength and durability of concrete.

University of Michigan, Ann Arbor, Mich.
Development of hair cracks in concrete into structural cracks.
Volume changes in concrete.

Minnesota Highway Department, St. Paul, Minn.
Effect of character of fine aggregate on mortar strength.
Effect of heating aggregates on concrete strength.
Soundness tests on gravel pebbles for concrete.

Minnesota Highway Department, Laboratory, Minneapolis, Minn.
The effect on concrete strength of various methods of curing laboratory specimens.

Minnesota Highway Department (in cooperation with the American Society for Testing Materials and others), St. Paul, Minn.
Effect of rate of freezing for freezing and thawing tests of aggregates.

Missouri Portland Cement Co., St. Louis, Mo.
Closed circuit grinding of limestone and shale.

Missouri School of Mines and Metallurgy, Department of Ceramic Engineering, Rolla, Mo.
The heat-resisting qualities of high-temperature cements when subjected to various preheating treatments.

Missouri State Highway Department, Jefferson City, Mo.
Durability of concrete as measured by freezing and thawing tests.
Loss of moisture from concrete cured by various methods.
The relative service rendered by culverts of corrugated metal pipe, vitrified clay pipe, concrete pipe, and concrete boxes.
Tests on various powdered admixtures for promoting workability of concrete.

Missouri State Highway Department (in cooperation with the American Associatic of State Highway Officials), Jefferson City, Mo.
Standardization of method of determining flexural strength of concrete.

National Building Units Corporation (in cooperation with the National Cinder Concrete Products Association and the United States Bureau of Standards), 122 East 42nd Street, New York, N. Y.
Cinders or boiler ashes as an aggregate for concrete.

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National Cinder Concrete Products Association (in cooperation with the National Building Units Corporation and the United States Bureau of Standards), 1600 Arch Street, Philadelphia, Pa.
Cinders or boiler ashes as an aggregate for concrete.

National Crushed Stone Association, 1735 14th Street, N.W., Washington, D.C.
Aggregates for concrete.

National Crushed Stone Association (in cooperation with the American Society for Testing Materials, the National Slag Association and the National Sand and Gravel Association), 1735 14th Street, N.W., Washington, D.C.
Suitability of stone sand, slag sand, and crushed-gravel sand for use as fine aggregate in concrete.

National Crushed Stone Association (in cooperation with the American Society for Testing Materials and others), 1735 14th Street, N.W., Washington, D.C.
Soundness of aggregate.

National Research Council, Highway Research Board, 2101 B Street, N.W., Washington, D.C.
Use of rail-steel reinforcement in highway construction.

National Research Council, Highway Research Board (in cooperation with Kansas State Agricultural College), 2101 B Street, N.W., Washington, D. C.
Volume changes in concrete.

National Research Council, Highway Research Board (in cooperation with the United States Bureau of Public Roads), 2101 B Street, N.W., Washington, D.C.
Significance of the sodium sulphate tests for concrete aggregates.

National Sand and Gravel Association, 545 Munsey Building, Washington, D.C.
Effect of grading of fine and coarse aggregate on strength of concrete.
Effect of briquet-molding pressure on strength ratio of sand mortars.
Crushing and abrasion tests of gravel for concrete.
Accelerated soundness tests of gravel for concrete.
Effect of mineral composition and shape of particles in coarse aggregate on strength of concrete.
Studies of new markets for sand and gravel.

National Sand and Gravel Association (in cooperation with the American Society for Testing Materials, the National Crushed Stone Association, and the National Slag Association), 545 Munsey Building, Washington, D.C.
Suitability of stone sand, slag sand, and crushed-gravel sand for use as fine aggregate in concrete.

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National Sand and Gravel Association (in cooperation with the American Society for Testing Materials and others), 545 Munsey Building, Washington, D.C.
Soundness of aggregate.

National Slag Association, 937 Leader Building, Cleveland, Ohio.
Properties of concretes in which slag has been used as the aggregate.
Development of a test for durability of slag concrete.

National Slag Association (in cooperation with the American Society for Testing Materials, the National Crushed Stone Association, and the National Sand and Gravel Association), 937 Leader Building, Cleveland, Ohio
Suitability of stone sand, slag sand, and crushed-gravel sand for use as fine aggregate in concrete.

Nazareth Cement Co., Nazareth, Pa.
The physical properties of the compounds resulting from the calcination of argillaceous limestones.
The economics of Portland-cement production.
The use of Portland cement in various industries.

Nevada State Highway Department, Carson City, Nev.
Reliability of 3-day tension tests for cement.

New Hampshire Highway Department (in cooperation with the American Society for Testing Materials), Concord, N. H.
Studies of workability of concrete contributing to the formation of specifications for aggregates.

University of New Hampshire, Durham, N. H.
Flexural tests of plain concrete beams.

New Jersey State Highway Department, Trenton, N. J.
Relative value of different methods now in use for curing concrete pavement.

New Jersey State Highway Department (in cooperation with the American Society for Testing Materials), Trenton, N. J.
Comparison of different methods of testing concrete sands to secure a standard method.

New York Board of Water Supply, New York, N. Y.
Improvement of Portland cement.

Port of New York Authority (in cooperation with the American Society for Testing Materials, the University of Illinois, and the United States Bureau of Public Roads), 80-90 8th Avenue, New York, N. Y.
Quality of concrete for bridge floor slabs with special reference to the use of light-weight aggregates.

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New York State Highway Commission, Laboratory, Albany, N. Y.
Rational analysis of sands used as fine aggregate for concrete.
Abrasion tests of sands for concrete.
Sodium sulphate soundness test for fine aggregate for concrete.

New York State Highway Commission (in cooperation with the American Society for Testing Materials and others), Albany, N. Y.
Soundness of aggregate.

Ohio State Highway Department, Testing Laboratory, Engineering Experiment Station, Ohio State University, Columbus, Ohio.
The compressive and beam strength of concrete made with high-early-strength cement.

Ohio State Highway Department (in cooperation with the American Society for Testing Materials and others), Testing Laboratory, Engineering Experiment Station, Ohio State University, Columbus, Ohio.
Abrasion of aggregates.

Ohio State Highway Department (in cooperation with the Standard Slag Co.), Testing Laboratory, Engineering Experiment Station, Ohio State University, Columbus, Ohio.
Relation between abrasion loss of gravel, crushed limestone, crushed slag, and their concrete-making properties.

Ohio State University, Columbus, Ohio.
Plastic flow of concrete.
Workability of concrete.

Ohio State University, Department of Mineralogy, Columbus, Ohio.
Properties of dicalcium silicate.

Ohio State University (in cooperation with the American Society of Civil Engineers, the Engineering Foundation, and others), Columbus, Ohio.
Concrete and reinforced concrete arches.

Ohio State University (in cooperation with the Calcium Chloride Association), Columbus, Ohio.
The effect of calcium chloride as a curing agent for Portland-cement concrete.

Ohio State University, Department of Mineralogy (in cooperation with the Calcium Chloride Association), Columbus, Ohio.
Effect of calcium chloride on hydration of minerals.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Filtration (for dewatering) of cement slurry, clay, and other materials.

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Oregon State Agricultural College (in cooperation with the American Society for Testing Materials), Corvallis, Oreg.
Study of various recommended methods for determining moisture content in concrete aggregate.

Oregon Portland Cement Co., Oswego, Oreg.
Proper calcination of slurry.
Grinding of clinker to correct grading of size of particles.

Pacific Coast Cement Co., Seattle, Wash.
Particle-size distribution and its effect on cement.
Methods of measuring, and means of producing plasticity in cement.
Handling flue dust from cement plants.
Quick determination of the composition of the raw cement mix.

Pennsylvania Department of Highways, Harrisburg, Pa.
Effect of [illegible] cement and hot mixing water on the setting time of Portland cement.
Effect of [illegible] of mix and consistency on strength of concrete.
Comparison of strength of concrete in which limestone was used as coarse aggregate with that using gravel.
Efficiency of high-early-strength cement compared with blended standard Portland cement.
Use of calcium chloride as a curing agent compared with sodium silicate, tar, asphalt, and wet straw.
Use of diatomaceous earth in concrete.

Pennsylvania Geological Survey (in cooperation with Lehigh University, cement companies, and other limestone users), Harrisburg, Pa.
The occurrence, structural features, origin, utilization and economics of the Pennsylvania limestones of economic importance.

Pierce Testing Laboratories (in cooperation with the Johns-Manville Corporatio Denver, Colo.
Permeability tests of concrete with and without admixtures of celite.

Portland Cement Association, Research Laboratory, 33 West Grand Avenue, Chicago, Ill.
Investigation of factors affecting the strength of concrete.
Chemical studies of Portland cement.
Constitution and hardening of Portland cement.
Fire resistance of walls of concrete-masonry units.
Permeability studies of concrete.
Factors affecting volume change of concrete and mortar.

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Portland Cement Association (in cooperation with the American Society for Testing Materials), 33 West Grand Avenue, Chicago, Ill.
Development of methods of test for measuring the durability of concrete.
Durability of concrete in relation to compressive strength, different water-cement ratios, and consistencies.

Portland Cement Association (in cooperation with the American Society for Testing Materials and the Johns-Manville Corporation), 33 West Grand Avenue, Chicago, Ill.
Workability of concrete.

Portland Cement Association (in cooperation with the American Society for Testing Materials and others), 33 West Grand Avenue, Chicago, Ill.
Investigation of the accuracy and practicability of various proposed methods of measuring the constituents of fresh concrete.
Soundness of aggregate.

Portland Cement Association (in cooperation with the United States Bureau of Standards), 33 West Grand Avenue, Chicago, Ill.
Effect of composition of cement clinker on the properties of the concrete made therefrom.
Influence of composition on the volume constancy of specimens of the set cements.
The chemical phenomenon of set of cement.
The measurement of rate of set of cement and its influence on the properties of cement.
The control of set of cement.
Heat of setting of cement.
Kinetics and thermodynamics of the hydration or setting process.
Phase equilibria study of the cement systems.
The adaptation of the X-ray method to a study of the constitution of Portland cement.

Rensselaer Polytechnic Institute, Troy, N. Y.
The effect of colloidal clay on the permeability, strength and weathering resistance of concrete.

Riverside Cement Co., 621 South Hope Street, Los Angeles, Calif.
Effects of composition of cement on its properties.
Effects of fineness of cement on its properties.
Studies in fine grinding.

City of Seattle, Engineer's Department (in cooperation with the State of Washington, Department of Highways), Seattle, Wash.
Studies of the Hunt process of curing concrete.

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Singmaster and Breyer, Metallurgical and Chemical Engineers, Room 2831, 420 Lexington Avenue, New York, N. Y.
Grinding of cement.
Production of high-lime cement.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Quick-setting acidproof cement for use with acidproof brick in the chemical industries.

Solidon Products (Inc.), Wolf and Water Streets, Philadelphia, Pa.
Preparation of magnesia cements.

South Dakota State School of Mines, Rapid City, S. Dak.
The manufacture of cement.

Standard Slag Company (in cooperation with the Ohio State Highway Department) Youngstown, Ohio.
Relation between abrasion loss of gravel, crushed limestone, crushed slag, and their concrete-making properties.

Superior Portland Cement (Inc.), Concrete, Wash.
Effect of particle size of components on burnability of cement raw mixtures.

Tennessee State Highway Department (in cooperation with the American Society for Testing Materials), Nashville, Tenn.
Method for determining the apparent specific gravity of coarse aggregate

Tennessee State Highway Department (in cooperation with the American Society for Testing Materials and others), Nashville, Tenn.
Uniformity of apparent specific gravity of fine and coarse aggregate from same deposit.
Investigation of the accuracy and practicability of various proposed methods of measuring the constituents of fresh concrete.

Agricultural and Mechanical College of Texas, College Station, Tex.
Effect of methods of curing on strength and wear-resistance of concrete.
Variations in temperature in plain concrete slabs as affected by type of curing.

United States Bureau of Mines, Nonmetallic Minerals Experiment Station (in cooperation with Rutgers University), New Brunswick, N. J.
Fundamental factors involved in the utilization of gypsum and anhydrite for cement retardation.

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United States Bureau of Public Roads, Washington, D. C.
The effect of quality of cement on quality of concrete.
Effect of character of fine aggregate on flexural strength of mortars.
Methods of determining absorption and free-water content of fine aggregates for concrete.
The relation between abrasion tests on fine aggregates and hardness tests of mortars.
Relation between coarse aggregate content and quality of pavement concrete.
Effect of mineral constituents of sand on the strength and hardness of cement mortars.
Development of abrasion tests of fine and coarse aggregates.
Durabiliity of cement mortars as affected by character of fine aggregate.
The segregation of water in concrete placed in deep forms.
Protective treatment of concrete against alkali and salt-water action.
Effect of method of test and size of coarse aggregate on the uniformity of flexure-test results.
Methods of curing concrete pavements.

United States Bureau of Public Roads (in cooperation with the American Society of Civil Engineers, the Engineering Foundation, and others), Washington, D.C.
Concrete and reinforced-concrete arches.

United States Bureau of Public Roads (in cooperation with the American Society for Testing Materials), Washington, D.C.
Tests for cement.
Standardization method for the determination of flexural strength of concrete.
Proposed alternate method of mortar test for sand for use in fine aggregate.
Effect of moisture conditions at test on stress-strain relation for concrete in compression and flexure.

United States Bureau of Public Roads (in cooperation with the American Society for Testing Materials and others), Washington, D.C.
Quality of concrete for bridge floor slabs with special reference to the use of light-weight aggregates.
Abrasion of aggregates.
Soundness of aggregate.

United States Bureau of Public Roads (in cooperation with the Maryland State Roads Commission), Washington, D.C.
Suitability of various materials for resurfacing old concrete pavements.
Comparative study of wet earth, calcium chloride and sodium silicate for curing concrete pavements.

United States Bureau of Public Roads (in cooperation with the National Research Council), Washington, D.C.
Significance of the sodium sulphate tests for concrete aggregates.

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United States Bureau of Reclamation (in cooperation with the University of Colorado and the Engineering Foundation), Washington, D.C.
- Rates of evaporation and absorption of mortar and concrete specimens of different sizes and shapes.
- Flow of concrete under continuous compressive, flexural, and tensile stress.
- Modulus of elasticity and Poisson's ratio of concrete.
- Modulus of elasticity in tension, torsion, and flexure of concrete.
- Volume changes in concrete due to changes in moisture conditions.

United States Bureau of Standards, Washington, D.C.
- Modulus of elasticity and Poisson's ratio of concrete.
- Physical properties of cast stone.
- Hardening of Portland cement at the boiling point of water.
- Effect of boric acid on the clinkering of cement.
- Thermal decomposition of tricalcium silicates.
- Reaction of water on calcium aluminates and calcium aluminate cements.
- Reaction of water on the calcium silicates.
- Properties of high-early-strength cements.
- Study of the workability of Portland-cement pastes and mortars with the object of developing an apparatus for measuring workability.
- Study of preparations used for the waterproofing of concrete.
- The durability of aggregates for use in concrete.
- Testing durability of cement by titration in sugar solution.
- Investigation of aggregate for, and properties of, cinder concrete building units.
- Physical properties of masonry cements and mortars, including plasticity, water-retaining capacity, volume change, workability, and others.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D.C.
- Weathering characteristics of concrete.

United States Bureau of Standards (in cooperation with Hugh L. Cooper and Co.) Washington, D.C.
- Effect of clays in concrete.

United States Bureau of Standards (in cooperation with the National Building Units Corporation and the National Cinder Concrete Products Association), Washington, D.C.
- Cinders or boiler ashes as an aggregate for concrete.

United States Bureau of Standards (in cooperation with the Portland Cement Association), Washington, D.C.
- Effect of composition of cement clinker on the properties of the concrete made therefrom.
- Influence of composition on the volume constancy of specimens of the set cements.
- The chemical phenomenon of set of cement.

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United States Bureau of Standards - Continued
The measurement of rate of set of cement and its influence on the properties of cement.
The control of set of cement.
Heat of setting of cement.
Kinetics and thermodynamics of the hydration or setting process.
Phase equilibria study of the cement systems.
The development of the X-ray method to a study of the constitution of Portland cement.

Universal Atlas Cement Co., 208 South La Salle Street, Chicago, Ill.
Use of cement.

Vermont State Highway Department (in cooperation with the University of Vermont), Montpelier, Vt.
Concrete pavement strengths.

University of Vermont and State Agricultural College (in cooperation with the Vermont State Highway Department), Burlington, Vt.
Concrete pavement strengths.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
Comparative efficiency of various cements and lime in mortars.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
The elastic properties of concrete.
The correlation of design and test data for simple reinforced-concrete beams.
The effect of grading of aggregate on cost of materials for a given strength.

State of Washington, Department of Highways, Olympia, Wash.
Development of specifications for high-early-strength cements.
Resistance of concrete to waters of acid reaction.
Transverse test of concrete.

State of Washington, Department of Highways (in cooperation with the City of Seattle), Olympia, Wash.
Studies of the Hunt process of curing concrete.

West Virginia State Highway Department, Charleston, W. Va.
Accelerated corrosion tests on culvert pipe of concrete, cast-iron, and corrugated-iron pipe with different coatings.

Wisconsin Highway Commission, Madison, Wis.
Comparison of methods of curing concrete pavements.
Effect of absorption of mixing water in relation to aggregates in designed mixes of concrete.
The effective age periods of high-early-strength cements.

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VII. Sand, Gravel and Crushed Stone
(Aggregates are included under Section C-VI, Cement and Concrete.)

American Foundrymen's Association (in cooperation with Cornell University and and the United States Bureau of Standards), 222 West Adams Street, Chicago, Ill.
Development of test methods and plant control of foundry sands (including molding and core sands).

Anthracite Institute, Laboratory (in cooperation with Lehigh University), Primos, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

Arkansas Lime Products Co., 501-504 State National Bank Building, Texarkana, Tex.-Ark.
Improvement of limerock for road-base purposes.

Buckeye Steel Castings Co., Columbus, Ohio.
Molding-sand research.

Certain-teed Products Corporation, York, Pa.
Suitability of crushed silica sand, waste sand (sand-blast sand) and other finely divided materials for use as fillers or aggregates in asphalt coatings on prepared or composition roofing.

Colorado Agricultural Experiment Station, Fort Collins, Colo.
Road materials of Colorado.

Cornell University (in cooperation with the American Foundrymen's Association) Ithaca, N. Y.
Development of standard methods of testing foundry sand.

The Dorr Co., 247 Park Avenue, New York, N. Y.
Glass sand purification.

Electric Steel Founders' Research Group, 541 Diversey Parkway, Chicago, Ill.
Use of core sands and molding sands.

Ford Motor Co., Dearborn, Mich.
Production of glass sand from lime-bonded sandstone.

University of Georgia, Athens, Ga.
Study of sand clay, semigravel, and similar materials for road betterment.

Iowa Geological Survey, Des Moines, Iowa.
Prospecting and mining the molding sands of Iowa.

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Kansas State Agricultural College, Engineering Experiment Station, Manhattan, Kans.
Road material resources of Kansas.

Lafayette College, Department of Geology and Geography (in cooperation with the Pennsylvania Geological Survey), Easton, Pa.
Studies of sands and gravels.

Lehigh University (in cooperation with Anthracite Institute), Bethlehem, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

Maine State Highway Department, Orono, Me.
Determination of the hardness of sand by a wear test.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Rock products fellowship.

Michigan State Highway Department, Laboratory, Ann Arbor, Mich.
Capillary characteristics of typical Michigan sheet-asphalt sands and their effect on stability.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Sand cores for foundry practice.

Missouri State Highway Department (in cooperation with the United States Bureau of Public Roads), Jefferson City, Mo.
Surface materials for low-cost roads.

National Crushed Stone Association, 1735 14th Street, N.W., Washington, D.C.
Stone for railroad ballast.
Aggregates for bituminous road construction.

National Sand and Gravel Association, 545 Munsey Building, Washington, D.C.
Standardization of sizes of sand and gravel.
Results of crushing gravel.
Methods of preventing segregation of sizes.
Studies of new markets for sand and gravel.
Effect of size and grading of sand and gravel on use.
Effect on use of shape and type of particle of sand and gravel.
Studies of soundness and durability of sand and gravel.
Effect of impurities in sand and gravel on use.

University of Nebraska, Lincoln, Neb.
Underground mining of stone.
Prospecting for glass sand.

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Nevada State Highway Department, Carson City, Nev.
Relation of grading and specific gravity of aggregates to amount of oil required on bituminous-treated gravel roads.

New York, Ontario, and Western Railroad, Hamilton, N. Y.
Industrial uses of a natural silica sand which passes a 300-mesh sieve.

University of North Carolina, Chapel Hill, N. C.
Development of improved methods of analyzing and classifying filter sands
Studies on the mechanical analysis of sands.
Mechanical analyses of beach sands and their significance.

Onio State University, Engineering Experiment Station, Columbus, Ohio.
Molding sand investigations.

Pennsylvania Geological Survey (in cooperation with Lafayette College), Harrisburg, Pa.
Studies of sands and gravels.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Grinding of silica and classification to be suitable for various commercial uses in the abrasive industries.

Stanford University, Stanford University, Calif.
The beneficiation of glass sands.

The Thompson and Lichtner Co. (Inc.), 930 Statler Building, Boston, Mass.
Utilization of special sands occurring with concrete aggregates.
Utilization of sand after employment for glass polishing.

United States Bureau of Public Roads, Washington, D.C.
Bituminous treatment of sandy-soil roads.
Bituminous treatments of crushed-stone and gravel roads.

United States Bureau of Public Roads (in cooperation with the Missouri State Highway Department), Washington, D.C.
Surface materials for low-cost roads.

United States Bureau of Standards, Washington, D.C.
Development and improvement of methods for the chemical analysis of glass sand.

United States Bureau of Standards (in cooperation with the American Foundrymen Association), Washington, D.C.
Development of standard methods of testing foundry sand.

United States Pipe & Foundry Co., Burlington, N. J.
Sand reclamation.

University of Utah, Utah Engineering Experiment Station, Salt Lake City, Utah.
Determination of the suitability of local sands for foundry purposes.

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VIII. Building Stone and Roofing Material

American Society for Testing Materials (in cooperation with Lafayette College, Lehigh University, the National Slate Association, Rensselaer Polytechnic Institute, and the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Methods of determining water absorption of slate.

American Society for Testing Materials (in cooperation with the National Slate Association and Northwestern University), 1315 Spruce Street, Philadelphia, Pa.
Acid and alkali resistance of slate.

American Society for Testing Materials (in cooperation with the National Slate Association and the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Abrasive hardness of slate.

Certain-teed Products Corporation, York, Pa.
Suitability of various nonmetallic substances such as slate-dust, limestone-dust, dolomite, clay, talc, crushed silica sand, waste sand (sand blast sand), and other finely divided materials for use as fillers or aggregates in asphalt coatings on prepared or composition roofings.

Flintkote Co., Rutherford, N. J.
Utilization of granular minerals in roofing.

Harrop Ceramic Service Co., 310 West Broad Street, Columbus, Ohio.
Preparation of colored clay granules.

The James E. Herron Co., 1360 West Third Street, Cleveland, Ohio.
Cleaning sandstone walls of atmospheric dirt.
Treatment of sandstone to prevent soiling or to facilitate cleaning.

Indiana Limestone Co., Bedford, Ind.
Utilizations of limestone by-products.
Physical properties of Bedford limestone.

Lafayette College, Department of Geology and Geography, Easton, Pa.
Investigation of physical properties of slate.

Lafayette College (in cooperation with the American Society for Testing Materials, the National Slate Association, Lehigh University, Rensselaer Polytechnic Institute, and the United States Bureau of Standards), Easton, Pa.
Methods of determining water absorption of slate.

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Lehigh University (in cooperation with the American Society for Testing Materials, Lafayette College, the National Slate Association, Rensselaer Polytechnic Institute, and the United States Bureau of Standards), Bethlehem, Pa.
Methods of determining water absorption of slate.

Lehigh University, Department of Geology (in cooperation with the Pennsylvania Geological Survey, cement companies and other limestone users), Bethlehem, Pa.
The occurrence, structural features, origin, utilization and economics of the Pennsylvania limestones of economic importance.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Prevention of discoloration of marble.
Staining marble with various colors.
Preparation of roofing granules from shale and fire clays with simultaneous production of brick.
Study of glazes and colors in ceramic roofing tile.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Roofing fellowship.

National Slate Association (in cooperation with the American Society for Testing Materials, Lafayette College, Lehigh University, Rensselaer Polytechnic Institute, and the United States Bureau of Standards), Drexel Building, Philadelphia, Pa.
Methods of determining water absorption of slate.

National Slate Association (in cooperation with the American Society for Testing Materials and the Northwestern University), Drexel Building, Philadelphia, Pa.
Acid and alkali resistance of slate.

National Slate Association (in cooperation with the American Society for Testing Materials and the United States Bureau of Standards), Drexel Building, Philadelphia, Pa.
Abrasive hardness of slate.

Northwestern University (in cooperation with the American Society for Testing Materials and the National Slate Association), Evanston, Ill.
Acid and alkali resistance of slate.

Pennsylvania Geological Survey (in cooperation with Lehigh University, cement companies, and other limestone users), Harrisburg, Pa.
The occurrence, structural features, origin, utilization and economics of the Pennsylvania limestones of economic importance.

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Pennsylvania State College, School of Mineral Industries, Department of Ceramics, State College, Pa.
Development of standard tests for roofing slate.

Rensselaer Polytechnic Institute, Troy, N. Y.
Investigation of the physical properties and weathering of structural slate.

Rensselaer Polytechnic Institute (in cooperation with the American Society for Testing Materials, Lafayette College, Lehigh University, the National Slate Association and the United States Bureau of Standards), Troy, N. Y.
Methods of determining water absorption of slate.

United States Bureau of Standards, Washington, D.C.
Study of the physical properties of cast stone.
Properties of building materials at high temperatures.
Fire tests of roofing materials.
Determination of the weather resistance of various natural stones under various constructional conditions.
Preservation or weatherproofing of natural stone in structures.
Determining the structural fitness or adaptability of natural stone to various uses.
Development and improvement of methods for the chemical analysis of dolomite and limestone.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials, Lafayette College, Lehigh University, the National Slate Association, and Rensselaer Polytechnic Institute), Washington, D.C.
Methods of determining water absorption of slate.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials and the National Slate Association), Washington, D.C.
Abrasive hardness of slate.

United States Geological Survey, Washington, D.C.
Resource and quality of various structural materials such as stone and aggregate.

Vermont Marble Co., Proctor, Vt.
New uses for waste marble.

Wayne Laboratories, 17 East Main Street, Waynesboro, Pa.
Development of permanent colors on rock granules by a firing process and by coating the granules.

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IX. Pigments

American Chemical Products Co., 7 Litchfield Street, Rochester, N. Y.
Developing uses for complex acid and salt compounds of tungsten and molybdenum, such as phosphotungstic acid, sodium phosphotungstate, ammonium and sodium phosphotungstates, silicotungstic acid, sodium silicotungstate, ammonium and other silicotungstates, phosphomolybdic acid and ammonium, sodium, and other phosphomolybdates. Fields of use indicated appear to be in the nonfading color preparation, printing colors, and ceramics.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Physical properties of paint materials.
Hiding power and tinting strength of paint pigments and paints.
Accelerated tests for protective coatings.

Anaconda Lead Products Co., 151st and McCook Avenue, East Chicago, Ind.
Measurement of physical properties of white lead pigments.
Controlling oil absorption of white lead.
Increasing covering power of white lead.
Effect of atmospheric agencies in weathering paint films.
Behavior of paint in container.

C. G. Buchanan Chemical Co., Baker Avenue, Norwood, Cincinnati, Ohio.
Production of ferrous and ferric salts from residues.

California Division of Highways, Sacramento, Calif.
Development of accelerated tests for determining quality of traffic-line lacquers.
Development and investigation of protective coatings for metal surfaces.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
Tests on paints for a variety of protective applications.
Rust inhibitors and neutralizers for addition to water.

Cheesman-Elliot Co., 639 Kent Avenue, Brooklyn, N. Y.
Studies of the possibilities and economies of various mineral products for paint purposes.

The Chemical & Pigment Co. (Inc.), Box 191, Collinsville, Ill.
The manufacture and development of lithopone.

The Eagle-Picher Lead Co., 134 North LaSalle Street, Chicago, Ill.
Production methods for zinc oxide, lead oxides, and white lead (basic lead carbonate and sulphate).
Application of zinc oxide, lead oxides (particularly litharge and red lead), and white lead (basic lead carbonate and sulphate) to customers' uses.

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Falls Electric Furnace Corporation, 660 Grant Street, Buffalo, N. Y.
Pigments produced by heat under various atmospheres.

Firestone Tire & Rubber Co., Akron, Ohio.
Evaluation of red oxides for use in coloring rubber products.

The Glidden Co., Cleveland, Ohio.
Prospecting and mining of barytes ore.
Beneficiation of barytes ore for the manufacture of paint.
Manufacture and utilization of cadmium, zinc, and lead pigments.

Grand Rapids Varnish Corporation, 565 Godfrey Avenue, Grand Rapids, Mich.
Utilization of nonferrous minerals such as barytes, aluminum silicate, and silica in the manufacture of paints.

Grasselli Chemical Co., Cleveland, Ohio.
Improvement of processes for manufacturing barium chloride, barium carbonate, and barium sulphate (blanc fixe).
The manufacture and use of cadmium products in pigments.
Manufacture and utilization of zinc oxide of pigment grade.

Illinois State Highway Department, Springfield, Ill.
Durability of paint for steel structures.
Effect of zinc chloride used as a wood preservative on white lead paint applied at a later date.

Institute of Paint and Varnish Research, 2201 New York Avenue, N.W., Washington, D.C.
Development of pigments.

Linfield College, McMinnville, Oreg.
Relation of whiteness to opacity for white pigments in paint and lacquers.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Production of pigments from nonmetallic minerals.

Minnesota State Highway Department, St. Paul, Minn.
Relative durability of different paints.

Mississippi Valley Research Laboratories (Inc.), 660 South 18th Street, St. Louis, Mo.
New process for production of high-grade blanc fixe.
Development of process for extraction of titanium from minerals containing less than 10 per cent of titanium oxide.

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Missouri Paint & Varnish Co., 5125 North 2nd Street, St. Louis, Mo.
Rust inhibitive coatings.
Pipe-line and storage-tank coatings and cements (oil, acid, and corrosion resistant).

Missouri School of Mines and Metallurgy, Missouri State Mining Experiment Station, Rolla, Mo.
Concentrating Missouri barite by flotation.

Monmouth College, Department of Physics and Geology, Monmouth, Ill.
Extraction of commercial titanium oxide from titaniferous clays.

The Chas. Moser Co., 215 East 9th Street, Cincinnati, Ohio.
Ferrous minerals and their processing for dry colors.

National Lead Co., Research Laboratories, 105 York Street, Brooklyn, N. Y.
Manufacture of lead oxide and lead arsenate.
Phases of white-lead manufacture.
Microscopic investigation of particle size of pigments.

National Research Council, Highway Research Board, 2101 B Street, N.W., Washington, D.C.
Calcium chloride as a dust palliative.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Mining and utilization of barytes.
Production of zinc pigments from zinc ores.
Utilization of zinc pigments in paint and lacquers, rubber, and ceramics.

Public Service Electric & Gas Co., Newark, N. J.
Accelerated aging tests of paint materials.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Investigations of paints and paint pigments.

The Stanley Chemical Co., East Berlin, Conn.
The resistance of pigments to weathering.

Superior Zinc Corporation, Bristol, Pa.
Treatment of zinc residues from chemical plants to produce metal or a marketable grade of zinc oxide.

Synthetic Iron Color Co., Richmond, Calif.
Oxidation of iron in ferrous solutions.
Formation of ultramarine blue.

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Syracuse University, Syracuse, N. Y.
The origin and alteration of titanium-bearing minerals, titanite, ilmenite, and rutile.

Titanium Pigment Co. (Inc.), Laboratory, 105 York Street, Brooklyn, N. Y.
Manufacture of titanium pigments and titanium salts from titanium ores.

Toch Brothers (Inc.), 443 Fourth Avenue, New York, N. Y.
Preparation of pigments from ochres, umbers, siennas, and similar earths.
Preparation of pigments from cadmium salts, chromium salts, and similar chemical products.

The Twining Laboratories, 2527 Fresno Street, Fresno, Calif.
Barytes-products and utilization.

R. T. Vanderbilt Co. (Inc.), 230 Park Avenue, New York, N. Y.; Laboratory at 33 Winfield Street, East Norwalk, Conn.
Uses of titanium dioxide (TiO_2).

X. Mineral Fillers, Clarifyers and Detergents.

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Revivification of fuller's earth used in contact and percolation methods for purifying oils.

Armstrong Cork Co., Lancaster, Pa.
The utilization of ochre in the manufacture of flooring materials.

Bethlehem Foundry & Machine Co. (Wedge Furnace Department), Bethlehem, Pa.
Drying and calcining (revivifying) filtering and clarifying earths such as fuller's earth and diatomaceous earth for repeated use, notably in filtering lubricating oils and sugar syrups.

Certain-teed Products Corporation, York, Pa.
Suitability of various nonmetallic substances such as slate-dust, limestone-dust, dolomite, clay, talc, crushed silica sand, waste sand (sand blast sand) and other finely divided materials for use as fillers or aggregates in asphalt coatings on prepared or composition roofings.

Drackett Chemical Co., 5020 Spring Grove Avenue, Cincinnati, Ohio.
Study of various mineral products in relation to household cleaning compounds.

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The Eagle-Picher Lead Co., 134 North La Salle Street, Chicago, Ill.
Production of zinc oxide and its application to customers' uses, especially in the rubber industry.
Production of lead oxides (particularly litharge and red lead) and their application to customers' uses, including use in rubber, storage battery, oil-refining, ceramic, and chemical industries.
Production of white lead (basic lead carbonate and sulphate) and its application to customers' uses.

Firestone Tire & Rubber Co., Akron, Ohio.
Alumina and silica as compounding ingredients for rubber.

Flintkote Co., Rutherford, N. J.
Clays for emulsification.

University of Florida, College of Pharmacy, Department of Chemistry, Gainesville, Fla.
Chemical and physical tests on Florida clays.

Garfield Manufacturing Co., Garfield, N. J.
Utilization of nonmetallic mineral filler in plastic compositions.
Agglomeration of mineral fillers under pressure.
Preparation and grading of nonmetallic mineral fibrous fillers.

The B. F. Goodrich Co., Akron, Ohio.
The use of various metallic oxides and nonmetallic products in the rubber industry.

Goodyear Tire and Rubber Co., Akron, Ohio.
Study of clays, barytes, and magnesia to produce products suitable for the rubber industry.

Johns-Manville Corporation, Manville, N. J.
The processing of diatomaceous silica and the use of products made therefrom for filtration and fillers.

Kansas City Testing Laboratory, 700 Baltimore Avenue, Kansas City, Mo.
Preparation and utilization of bentonite.

University of Nebraska, Lincoln, Neb.
Prospecting for commercial deposits of volcanic ash.

University of North Carolina, Chapel Hill, N. C.
Development of improved methods of analyzing and classifying filter sands.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas, State College, Pa.
Investigation of bentonite in Central Pennsylvania.

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The Ruberoid Co., 95 Madison Avenue, New York, N. Y.
Use of slate, asbestos, talc, mica, and other minerals as mineral surfacings and fillers.

Sinclair Refining Co., Development Department, East Chicago, Ind.
Reactivation of used contact-treating clays.

Tennessee Copper Co., Copperhill, Tenn.
Preparation of bentonite for oil purification.

Agricultural and Mechanical College of Texas, Department of Geology, College Station, Tex.
Mineralogical study, tests for the identification of, and tests for the value of fuller's earth as a filtering agent.

Texas Pacific Coal & Oil Co., 1710 Ft. Worth National Bank, Ft. Worth, Tex.
Recovery of fine contact clays.

Texas Technological College, Department of Geology, Lubbock, Tex.
Study of volcanic ash deposits of West Texas.

The Twining Laboratories, 2527 Fresno Street, Fresno, Calif.
Pumicite utilization.

United States Bureau of Mines, Northwest Experiment Station (in cooperation with the University of Washington), Seattle, Wash.
Studies of whiting, chalk, and powdered limestone.

United States Geological Survey, Washington, D.C.
Mineralogical and resource studies of bentonite.
Distribution, character, quantity, and possible use of pumicite (volcanic ash).
Distribution, character, amount, geological relationships, and possible utility of diatomaceous earth.

University of Washington (in cooperation with the United States Bureau of Mines), Seattle, Wash.
Studies of whiting, chalk, and powdered limestone.

XI. Acids, Alkalis, Salts, and Sulphur

(See also Section C-XII - Phosphates and Their Derivatives)

Alcoa Ore Co., East St. Louis, Ill.
Increased use of bauxite and refined products in chemical industries.

Aluminum Co. of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Preparation of pure alumina from bauxite and other aluminous materials.

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American Potash & Chemical Corporation, Trona, Calif.

Improvements in process and equipment for extraction of alkali-metal salts from Searles Lake brine by evaporation and fractional crystallization (present products: Borax, boric acid, potassium chloride).

Phase rule study of complex systems of salts and water, including the Searles Lake system under present equilibrium conditions as well as study of equilibrium at the end-point of crystallization where several new minerals are possible. This study also applies to Owens Lake where at least one new mineral probably exists at present.

Study of the rate of crystallization, including the crystallization velocity of various faces of a crystal under various conditions of temperature, supersaturation and presence of impurities. This work is chiefly with borax for which definite relations have been found between external conditions and crystal habit.

Study of the properties of sodium borate minerals and salts, mainly in regard to conditions of stability.

Development of a process for possible large-scale production of soda ash and anhydrous sodium sulphate.

Study of possibilities of recovering bromine and lithium from end liquors of potash plant.

New uses for borax and boric acid.

Armour Fertilizer Works, 111 West Jackson Boulevard, Chicago, Ill.

Mining and utilizing alunite.

Raymond F. Bacon, 271 Madison Avenue, New York, N. Y.

Sulphur extraction and utilization.

Blockson Chemical Co., Joliet, Ill.

Utilization of magnesite for manufacture of epsom salt.

Bucknell University, Lewisburg, Pa.

The production of alumina and potassium sulphate from alunite.

C. F. Burgess Laboratories, Incorporated, 1011 East Washington Avenue, Madison, Wis.

Economic recovery of the constituents of bauxites, clays, and other silicates.

California Chemical Corporation, Newark, Calif.

Production of bromine, potash, magnesium hydrate, carbonate, and oxide from sea-water bittern.

Preparation and properties of gypsum as a by-product from bittern.

Calumet Chemical Co., Joliet, Ill.

Extraction and processing Al_2O_3 from sulphuric acid digestion of bauxite ore.

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Carus Chemical Co., La Salle, Ill.
Efficient production of manganese salts from manganese ores.

Catholic University of America, Department of Geology, University Station, Washington, D.C.
A study of the ultimate sources of potash.

Detroit Testing Laboratory, 554 Bagley Avenue, Detroit, Mich.
Extraction of potash and borax.

Freeport Sulphur Co., Freeport, Tex.
Removal of carbonaceous matter from molten sulphur.

Georgetown University, 37th and O Streets, N.W., Washington, D.C.
The application of the new allotropic forms of sulphur to vulcanization of rubber.

Grasselli Chemical Co., Cleveland, Ohio.
The utilization of chromium minerals for the manufacture of chromic acid.
Improvement of processes for the utilization of salt in the manufacture of hydrochloric acid.
The improvement of processes for manufacturing sulphuric acid.
The utilization of aluminum-bearing minerals, such as bauxite, in the manufacture of alum and aluminum chloride.
Improvement of processes for manufacturing barium chloride, barium carbonate, and barium sulphate.
The manufacture and use of cadmium products in electroplating, pigments, and other industries.
Utilization of lead acetate.
Improvement of processes for the manufacture of sodium sulphate, sodium bisulphate, and sodium sulphide.
Utilization of sodium silicate.
Industrial utilization of fluorides and silicofluorides.
The manufacture and utilization of zinc chloride and zinc sulphate.
Utilization of lead arsenate, manganese arsenate, calcium arsenate, and barium fluosilicate for spray products and insecticides.
Manufacture of barium fluosilicate from barite, witherite, and apatite.
Manufacture of manganese arsenate from white arsenic and manganese minerals such as pyrolusite and rhodochrosite.
Utilization of strontianite and celestite in the manufacture of strontium nitrate.
The manufacture of tin chloride.

Harvard University, Cambridge, Mass.
Structure studies on a borate mineral.

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Illinois State Highway Department, Springfield, Ill.
Effect of zinc chloride used as a wood preservative on white-lead paint applied at a later date.

University of Illinois, Agricultural Experiment Station, Urbana, Ill.
Effect of potassium carriers on soil productivity.
The relation of sulphur to plant nutrition and soil fertility.
Effect of sulphur carriers on soil productivity.

Kansas Geological Survey, Lawrence, Kans.
Isopachus map of the upper Permian salt in Kansas.

Kobbé Laboratories (Inc.), 114 East Thirty-Second Street, New York, N. Y.
Development of new uses for sulphur.

University of Maryland, Agricultural Experiment Station, College Park, Md.
Phosphates, potash, sulphur, lime, boron and other chemicals as plant foods.

Massachusetts Agricultural College, Experiment Station, Amherst, Mass.
Use of potash and lime in fertilizers.

Merrimac Chemical Co. (Inc.), 148 State Street, Boston, Mass.
Sulphate of alumina from clay.
Barium salts from barytes.

Monsanto Chemical Works, 1724 South 2nd Street, St. Louis, Mo.
Manufacture of alum from clay.

University of North Carolina, Chapel Hill, N. C.
Extraction of potassium and of aluminum from feldspar.
Removal of traces of iron from aqueous-salt solutions.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Vacuum evaporation of salt brines.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
Survey of the chemical composition of the salt in the salt plains of Oklahoma.

Oregon Agricultural Experiment Station, Soils Department, Corvallis, Oreg.
Use of land plaster and sulphur as a fertilizer material.
The use of land plaster and sulphur as a soil amendment on alkali soils.

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Pacific Alkali Co., 1206 Pacific Mutual Building, Los Angeles, Calif.
Method for analysis of solutions containing Na_2CO_3, $NaHCO_3$, $Na_2B_4O_7$, $Na_2B_2O_4$.
The equilibrium constant for the reaction: $H_2O + 2Na_2CO_3 + Na_2B_4O_7 = 2\ Na_2B_2O_4 + 2\ NaHCO_3$.
The activities of Na_2CO_3, $NaHCO_3$, $Na_2B_2O_4$, $Na_2B_4O_7$, Na_2SO_4, $NaClHBO_2$, and Na_2SiO_3 in strong salt solution and their effect on each other.

University of Pennsylvania, 34th and Spruce Streets, Philadelphia, Pa.
Preparation of the oxy salts of magnesium.

Purdue University, Agricultural Experiment Station, Lafayette, Ind.
Role of potassium in plant growth.

Rhode Island Agricultural Experiment Station, Kingston, R. I.
Sources of potash for fertilizers.

University of Rochester, Department of Geology, Rochester, N. Y.
The origin of the salt of New York State.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Use of insecticides and fungicides containing sulphur.
Use of fertilizers including phosphates, limestones, marls, potash minerals, nitrates, sulphur and ammonium salts.

Ernest Scott & Co., Box 259, Fall River, Mass.
Manufacture of caustic soda and recovery from waste spent liquors.

Solidon Products (Inc.), Wolf and Water Streets, Philadelphia, Pa.
Study of the oxy salts of magnesium that may be produced from calcined magnesite.
Preparation of MgO from magnesite.
Preparation of magnesia cements.

South Dakota State School of Mines, Rapid City, S. Dak.
The extraction of aluminum from clays and other aluminous minerals.

Syracuse University, Department of Chemistry, Syracuse, N. Y.
Decomposition of silicates with alkaline oxides.

Texas Agricultural Experiment Station, College Station, Tex.
Sulphur as a fungicide, insecticide, and soil amendment.
Fertilizers, control measures and field experiments to determine needs of soil for nitrogen, phosphoric acid, and potash.

University of Texas, Bureau of Industrial Chemistry, Austin, Tex.
Refining of polyhalite.

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Thiokol Corporation, Yardville, N. J.
Manufacture of a rubber-like substance from ethylene and sulphur and research on rubber and allied plastics.

United States Bureau of Chemistry and Soils, Fertilizer and Fixed Nitrogen Investigations, Washington, D.C.
Extraction of potash from American raw materials.

United States Bureau of Mines, Non-Metallic Minerals Experiment Station, New Brunswick, N. J.
Extraction of potash from polyhalite, greensand, wyomingite, and alunite.
Economic study of processes for the extraction of potash and other valuable products from wyomingite and alunite.

United States Geological Survey, Washington, D.C.
Location, mode of occurrence, extent, quality, and possible tonnage of nitrates in more favorable localities.
Geologic relations, distribution and character of natural sodium salts and to a certain extent the economic features of each deposit.
Location, depth, extent, mineralogical composition and relations, broader geological relations and genesis of potash.
Potash and salt mining methods.

Agricultural College of Utah, Experiment Station, Logan, Utah.
Weed control, using calcium chlorate, sodium chlorate, and magnesium chlorate.
Use of fertilizers, including treble superphosphate, potassium chloride, sulphur, and others.

University of Utah, Salt Lake City, Utah.
Recovery of potash from tailings of porphyry copper properties.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research, Salt Lake City, Utah.
Preparation of chlorate weed killers from bitterns of salt industries located on the Great Salt Lake.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
The manufacture of sulphate from Tazewell County (Virginia) manganese ores.

Virginia Smelting Co., West Norfolk, Va.
Production and use of SO_2 and other chemicals.

Western Precipitation Co., 1016 West Ninth Street, Los Angeles, Calif.
The recovery of potash from cement materials.

University of Wisconsin, Agricultural Experiment Station, Madison, Wis.
The effects of nitrate of soda on the soil.
The needs of Wisconsin soils for potash fertilizer.

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XII. Phosphates and Their Derivatives

Alabama Experiment Station, Auburn, Ala.
A comparison of the availability of various phosphates for fertilizer purposes.

American Agricultural Chemical Co., 420 Lexington Avenue, New York, N. Y.
Manufacture of phosphoric acid and phosphates.
Recovery of phosphate rock from debris by screening, classification, tabling, flotation, and electrical induction methods.
Washing and drying phosphate rock.

American Chemical Paint Co., Ambler, Pa.
Preparation and purification of phosphoric acid from phosphate rock.
The discovery of new uses for phosphoric acid and phosphates.
Application of phosphoric acid in metal protection and finishing.

Armour Fertilizer Works, 111 West Jackson Boulevard, Chicago, Ill.
Mining and utilizing phosphate rock.

Blockson Chemical Co., Joliet, Ill.
The manufacture and use of phosphoric acid from phosphate rock by the sulphuric-acid process.

Calumet Chemical Co., Joliet, Ill.
Extraction and processing P_2O_5 from sulphuric acid digestion of Florida pebble phosphate.

General Engineering Co., Salt Lake City, Utah; 50 Broad Street, New York, N.Y.
Investigating the treatment of Florida phosphates.

Grasselli Chemical Co., Cleveland, Ohio.
The manufacture of phosphoric acid, and the utilization of phosphate rock or apatite.
Improvement of processes for the manufacture of phosphates of soda.

Harvard University, Harvard Engineering School, Cambridge, Mass.
Preparation of fertilizer from phosphate rock.

University of Illinois, Agricultural Experiment Station, Urbana, Ill.
Comparison of rock phosphate with acid phosphate in soil bin studies.
Influence of factors affecting the effectiveness of phosphate fertilizers.
Response of Illinois soils to phosphorus.
Factors influencing the value and effectiveness of rock phosphate as a fertilizer.

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University of Maryland, Agricultural Experiment Station, College Park, Md.
Phosphates, potash, sulphur, lime, boron, and other chemicals as plant foods.

Montana Agriculture Experiment Station, Bozeman, Mont.
The effect of phosphate fertilizer on yield and phosphate content of forage crops.

University of North Carolina, Chapel Hill, N. C.
Recovery of phosphorus from natural phosphorites by sulphur dioxide.

Pennsylvania Agricultural Experiment Station, State College, Pa.
Field tests of different carriers of phosphorus.

Purdue University, Agricultural Experiment Station, Lafayette, Ind.
Role of phosphorus in plant growth.

Rhode Island Agricultural Experiment Station, Kingston, R. I.
Sources of phosphorus for fertilizers.

F. S. Royster Guano Co., Norfolk, Va.
Treatment of phosphate rock with sulphuric acid to make sulphosphate.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Use of fertilizers including phosphates, limestones, marls, potash minerals, nitrates, sulphur, and ammonium salts.

Swann Research (Inc.), Anniston, Ala.
Phosphoric acid production and utilization.
Problems in the production of sodium phosphate, mono calcium phosphate, and ammonium phosphate.

University of Tennessee, Agricultural Experiment Station, Knoxville, Tenn.
Comparative value of different phosphates, both alone and in mixtures with ground limestone.
Nature of the combinations that ensue when P_2O_5 is supplied to the soil by acid phosphate with and without supplements of limestone and dolomite.

Texas Agricultural Experiment Station, College Station, Tex.
Fertilizers, control measures, and field experiments to determine needs of soil for nitrogen, phosphoric acid, and potash.

United States Bureau of Chemistry and Soils, Fertilizer, and Fixed Nitrogen Investigations, Washington, D.C.
Technology of phosphate utilization.

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United States Bureau of Standards, Washington, D.C.
Development and improvement of methods for the chemical analysis of phosphate rock.

United States Geological Survey, Washington, D.C.
The location, depth, extent, thickness, quality, and classifiable tonnage of the phosphate resources of the western field.

Agricultural College of Utah, Experiment Station, Logan, Utah.
Use of fertilizers, including treble superphosphate, potassium chloride, sulphur, and others.

Victor Chemical Works, 343 South Dearborn Street, Chicago, Ill.
Extraction of phosphorus from phosphate rock in a fuel-fired furnace.
Recovery of phosphorus from ferrophosphorus.
Utilization of phosphorus in the production of phosphorus-containing compounds.

Virginia-Carolina Chemical Corporation, Richmond, Va.
The utilization of phosphate rock in the manufacture of phosphoric acid and fertilizers.
The extraction and processing of phosphate rock.

West Virginia Agricultural Experiment Station, Morgantown, W. Va.
The effects of low-calcium and low-phosphorus rations in growing dairy heifers.

University of Wisconsin, Agricultural Experiment Station, Madison, Wis.
The value of lime phosphate as a fertilizer and as a mineral feed for livestock.
Digest of the world's literature pertaining to phosphorus in relation to soils, fertilizers, and plant life.

XIII. Water, Water Treatment, and Stream Pollution

American Boiler Manufacturers Association (in cooperation with the American Railway Engineering Association, the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Water Works Association, the National Electric Light Association and the Ohio State University), 801 Rockefeller Building, Cleveland, Ohio.
Priming and foaming of boiler waters.

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American Railway Engineering Association (in cooperation with the American Boiler Manufacturers Association, the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Water Works Association, the National Electric Light Association and the Ohio State University), 431 South Dearborn Street, Chicago, Ill.
Priming and foaming of boiler waters.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Prevention of stream pollution by development of pickling liquor by-products.

American Society of Mechanical Engineers (in cooperation with the American Boiler Manufacturers Association, the American Railway Engineering Association, the American Society for Testing Materials, the American Water Works Association, the National Electric Light Association and the Ohio State University), 29 West 39th Street, New York, N. Y.
Priming and foaming of boiler waters.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials, the American Water Works Association, the University of Michigan, and the National Electric Light Association), 29 West 39th Street, New York, N. Y.
Development of standard methods for water analysis.

American Society for Testing Materials (in cooperation with the American Boiler Manufacturers Association, the American Railway Engineering Association, the American Society of Mechanical Engineers, the American Water Works Association, the National Electric Light Association and the Ohio State University), 1315 Spruce Street, Philadelphia, Pa.
Priming and foaming of boiler waters.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers, the American Water Works Association, the University of Michigan, and the National Electric Light Association), 1315 Spruce Street, Philadelphia, Pa.
Development of standard methods for water analysis.

American Water Works Association (in cooperation with the American Boiler Manufacturers Association, the American Railway Engineering Association, the American Society of Mechanical Engineers, the American Society for Testing Materials, the National Electric Light Association, and the Ohio State University), 170 Broadway, New York, N. Y.
Priming and foaming of boiler waters.

American Water Works Association (in cooperation with the American Society of Mechanical Engineers, the American Society for Testing Materials, the University of Michigan, and the National Electric Light Association), 170 Broadway, New York, N. Y.
Development of standard methods for water analysis.

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Anthracite Institute Laboratory (in cooperation with Lehigh University), Primos, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

Brooklyn Edison Co. (Inc.), 380 Pearl Street, Brooklyn, N. Y.
Study of conditioning methods for boiler water.

California Filter Co., 981 Folsom Street, San Francisco, Calif.
Boiler-water treatment for high-pressure boilers.
Water purification, color removal, iron removal, and control of slimes.

Detroit Edison Co. (in cooperation with the University of Michigan), Detroit, Mich.
Solubility of calcium sulphate from 0 to 200°C.

Elgin Softener Corporation, 57 North Street, Elgin, Ill.
Synthesizing base-exchange minerals or artificial zeolites.
Preparation and cleaning of greensand for water purification.
Base-exchange properties of galuconite in water softening.
Water purification by natural and synthetic zeolites.
Physicochemical properties of zeolite-treated boiler waters.

Emory University, Department of Physics, Emory University, Ga.
Radioactivity of the waters and rock around Stone Mountain.

Freeport Sulphur Co., Freeport, Tex.
Boiler feed water treatment.
Treatment of discharge water containing sulphides (bleed water) for disposal purposes.

Hall Laboratories (Inc.), Pittsburgh, Pa.
Development of methods for determining hydroxide, carbonate, phosphate, and sulphate content of boiler water and testing adaptability to field practice.
Water conditioning and prevention of corrosion-scale formation and boiler-metal cracking in steam-generating stations.
Investigation of causes of remaining hardness in effluent water from a lime-soda softener.

University of Illinois, Urbana, Ill.
Effect of pressure and temperature on the behavior of salts in boiler-feed water.

Inversand Co., Clayton, N. J.
The manufacture of a water-softening zeolite from greensand.

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Lehigh University (in cooperation with Anthracite Institute), Bethlehem, Pa.
Comparative efficiencies of sand and fine anthracite in water purification.

Linfield College, Physics Department, McMinnville, Oreg.
The radioactive properties of certain mineral springs in the neighborhood of McMinnville, Oreg.

University of Michigan, Ann Arbor, Mich.
Formation and properties of boiler scale.
Mechanism of formation of calcium sulphate boiler scale.
Formation and thermal effects of calcium sulphate boiler scale.
Thermal effects of boiler scale.
Crystal forms of calcium sulphate.

University of Michigan (in cooperation with the American Society of Mechanical Engineers, American Society for Testing Materials, National Electric Light Association, and American Water Works Association), Ann Arbor, Mich.
Development of standard methods for water analysis.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Solubility of calcium sulphate from 0 to 200°C.

Montana State School of Mines, State Bureau of Mines and Geology, Butte, Mont.
Prospecting for artesian water in eastern and central Montana.

National District Heating Association (in cooperation with the National Tube Co.), 603 South Broadway, Greenville, Ohio.
Effect of impure waters on water supply and steam and hot-water piping.

National Electric Light Association (in cooperation with the American Boiler Manufacturers Association, the American Railway Engineering Association, American Society of Mechanical Engineers, American Society for Testing Materials, American Water Works Association, and the Ohio State University), 420 Lexington Avenue, New York, N. Y.
Priming and foaming of boiler waters.

National Electric Light Association (in cooperation with the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Water Works Association and the University of Michigan), 420 Lexington Avenue, New York, N. Y.
Development of standard methods for water analysis.

National Tube Co., Research Laboratory (in cooperation with the National District Heating Association), 4910 Forbes Street, Pittsburgh, Pa.
Effect of impure waters on water supply, and steam and hot-water piping.

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North Dakota State Water Geologist, Howard E. Simpson, University Station, Grand Forks, N. Dak.
Methods of prospecting for city and industrial ground-water supplies.

Ohio State University, Columbus, Ohio.
Study of priming and foaming in boiler-feed water.

Ohio State University (in cooperation with the American Boiler Manufacturers Association, the American Railway Engineering Association, the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Water Works Association and the National Electric Light Association), Columbus, Ohio.
Priming and foaming of boiler waters.

Oregon State Agricultural College, Department of Mechanical Engineering, Corvallis, Oreg.
Introduction into boilers of make-up steam instead of make-up water.

Pacific Coast Coal Co., Seattle, Wash.
Clarification of water from coal washeries.

University of Rochester, Institute of Applied Optics, Rochester, N. Y.
Radioactive content of spring waters in the neighborhood of Rochester.

The Trees Oil Co., Winfield Kans.
Analysis of oil-field waters.

United States Geological Survey, Washington, D.C.
Improvement of methods in drilling, casing, and screening water-supply wells.
Methods of recovery of ground water.
Water-yielding capacity of water-bearing beds in relation to method of recovery and to utilization.
Stratigraphy, geologic structure, and areal distribution of water-bearing beds.
Mode of occurrence, source, total quantity, and quantity of water which can be recovered economically.
Relation between chemical character of ground water and geologic occurrence.
Physical character of water-bearing materials in relation to recharge, discharge, and recovery of ground water, including laboratory determination of mechanical composition, porosity, permeability, and specific yield (quantity of water not absorbed on surfaces of grains).
Development of methods of determining permeability and specific yield of undisturbed materials in the field.
Identification of oil-field waters.

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XIV. Safety, Health, and Miscellaneous

Aluminum Company of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Miscellaneous uses for bauxite and alumina.

American Chemical Products Co., 7 Litchfield Street, Rochester, N. Y.
Use of complex acid and salt compounds of tungsten and molybdenum in heavy solutions for mechanical separation of minerals.
The development of uses for osmium and osmic acid.

Anaconda Lead Products Co., 151st and McCook Avenues, East Chicago, Ind.
Lead compounds for insecticide purposes.

The Deister Concentrator Co., 901 Glasgow Avenue, Fort Wayne, Ind.
Separation and recovery of mica and kaolin.

General Engineering Co., Salt Lake City, Utah; 50 Broad Street, New York, N.Y.
Investigating the treatment of fluorspar ores from Texas.

Harvard University, The Harvard Engineering School, 112 Pierce Hall, Cambridge, Mass.; and The Harvard School of Public Health, 55 Van Dyke Street, Boston, Mass.
Control of the dust hazard in the granite industry.

Johns-Manville Corporation, Manville, N. J.
The processing of diatomaceous silica and the use of products made therefrom for abrasives and miscellaneous uses.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Utilization of various nonmetallic minerals, such as talcs, in sculpture

University of Maryland, Agricultural Experiment Station, College Park, Md.
Phosphates, potash, sulphur, lime, boron, and other chemicals as plant foods.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Silicate fellowship.
Slag fellowship.

Metropolitan Life Insurance Co., Policyholders Service Bureau, 1 Madison Avenue, New York, N. Y.
Investigation of effects of inhalation of asbestos-dust.

Minerals Separation North American Corporation, 11 Broadway, New York, N. Y.; 220 Battery Street, San Francisco, Calif.
Flotation treatment of nonmetallic ores.

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Mississippi Valley Research Laboratory, 660 South 18th Street, St. Louis, Mo.
Development of new uses of basalt.

Monmouth College, Department of Physics and Geology, Monmouth, Ill.
Extraction of finely divided colloidal silica from clays.
Extraction of metallurgical alumina from clays.

National Safety Council (in cooperation with the United States Public Health Service), 108 East Ohio Street, Chicago, Ill.
Efficiency of ventilating devices in certain dusty trades, such as sand blasting.

National Slag Association, 937 Leader Building, Cleveland, Ohio.
Physical and chemical properties of slags.
Development of new uses for slag.
Development and standardization of test methods for slag and its products.

University of New Hampshire, Department of Geology, Durham, N. H.
Garnet deposits of Wilmot and Danbury, N. H.

Norton Co., Worcester, Mass.
Electric-furnace abrasives.

Ost Laboratories, 6921 Natural Bridge Road, St. Louis, Mo.
Improvement of light sensitive selenium cells.

Pennsylvania Salt Manufacturing Co., Widener Building, Philadelphia, Pa.
Purification of cryolite by mechanical methods.
Purification of bauxite by mechanical methods.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Suspension of suitable glass-insoluble abrasives in molten glass in the manufacture of abrasive glass.

Spencer Lens Co., 19 Doat Street, Buffalo, N. Y.
Location of source of supply for fluorite and calcite of good optical grade.

Swann Research (Inc.), Anniston, Ala.
Aluminous abrasive production.

University of Tennessee, Agricultural Experiment Station, Knoxville, Tenn.
Testing fluosilicates and the manner of their action.

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United States Bureau of Mines, Nonmetallic Minerals Experiment Station (in cooperation with Rutgers University), New Brunswick, N. J.
Utilization of uncommon nonmetallic minerals in metallurgical processes.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Physiological effects of dusts.

United States Bureau of Standards, Washington, D.C.
Development and improvement of methods for the chemical analysis of dolomite, limestone, feldspars, fluorspar, glass sand, phosphate rock, bauxite, and chromite.

United States Geological Survey, Washington, D.C.
Occurrence, geologic relations, distribution, genesis, and mineralogy of lithium.

United States Public Health Service, Office of Industrial Hygiene and Sanitation, 16 Seventh Street, S.W., Washington, D.C.
Health of workers exposed to siliceous dust, such as those in the granite industry.
Efficiency of ventilating devices in certain dusty trades, such as the granite industry.

United States Public Health Service, Office of Industrial Hygiene and Sanitation (in cooperation with the National Safety Council), 16 Seventh Street, S.W., Washington, D.C.
Efficiency of ventilating devices in certain dusty trades such as sand blasting.

R. T. Vanderbilt Co. (Inc.), 230 Park Avenue, New York, N. Y.; Laboratory, 33 Winfield Street, East Norwalk, Conn.
Use of selenium in rubber.
Use of tellurium in rubber.

Virginia Agricultural Experiment Station, Blacksburg, Va.
Preparation of calcium sulphide for fungicide purposes from anhydrous calcium sulphate mined in Virginia.

Wittenberg College, Department of Chemistry, Springfield, Ohio.
Preparation of basic (dolomitic lime) digestants for straw utilized in the manufacture of straw paper.

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D. METALLIC ORES AND PRODUCTS

I. Origin, Occurrence, Prospecting, Mining and Economics

John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York, N. Y.
Deposition of ore minerals from hot aqueous solutions at high pressures.

Harvard University, Cambridge, Mass.
Geological studies of the gold ores of the Homestake Mine, Lead, S. Dak.

Harvard University, Harvard Engineering School, Department of Mining Engineering, Roteh Building, Cambridge, Mass.
The effect of rock structure, permeability and composition on enrichment of ore deposits and their persistence in depth, especially at the following mines: Homestake, S. Dak.; Hollinger, Ont.; Hercules, Id.; San Luis Properties, Mexico; Morro Velho, Brazil; Cerro de Pasco Properties, Peru.

Michigan College of Mining and Technology, Houghton, Mich.
The stratigraphy of the Negannee formation of the Marquette District
Investigation of radio-field strengths above and below the earth's surface in the copper country of Michigan.

Geological Survey of Minnesota, University of Minnesota, Minneapolis, Minn.
Origin of the iron ores of Minnesota.

University of Minnesota, Minneapolis, Minn.
Zoning of metalliferous deposits.

Montana State School of Mines, State Bureau of Mines and Geology, Butte, Mont.
Geology and ore deposits of Bennack and Argenta.

State University of Montana, Department of Geology, Missoula, Mont.
Occurrence of chromite, molybdenite, and other minerals in Montana.

University of Rochester, Rochester, N. Y.
Economic geology of the Opemiska Region, Canada, and of the Mosquito Range, Colo.
Economic effects of the discovery and production of gold in South Africa.

St. Edward's University, Austin, Tex.
The relation of ultrabasic igneous rocks to other rocks; their rare mineral content (chromium ores, corundum, platinum group metals, and others), and their alteration to serpentine, asbestos, talc, and steatite.

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United States Geological Survey, Washington, D. C.
Geologic relations, genesis, distribution, character, quantity available, and to a certain extent the economic features of mineral deposits.

Wabash College, Department of Chemistry, Crawfordsville, Ind.
Investigation of the alleged occurrence of colloidal noble metals in certain sedimentary rocks.

II. Beneficiation

University of Alabama, School of Chemistry, Metallurgy and Ceramics, University, Ala.
Removal of phosphorous from Alabama red ores before reaching the furnace.

University of Alabama (in cooperation with the United States Bureau of Mines), University, Ala.
Gravity concentration of the high-lime, red iron ores of the Chattanooga district.

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Iron-ore concentration.

Aluminum Co. of America, Aluminum Research Laboratory, Box 77, New Kensington, Pa.
Milling and beneficiation of bauxite.

American Cyanamid Co., 535 Fifth Avenue, New York, N. Y.
Use of cyanide in the selective flotation of base-metal ores.
Flotation tests on silver, gold, lead, copper, and zinc minerals and native copper.

Bagdad Copper Corporation, Hillside, Ariz.
Flotation of gold ores.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Beneficiation of lean iron ores.

Bucknell University, Lewisburg, Pa.
The mechanical concentration of ferberite (iron tungstate).

Case School of Applied Science, University Circle, Cleveland, Ohio.
Beneficiation of one of the Lake Superior iron ores.

Cerro de Pasco Copper Corporation, 44 Wall Street, New York, N. Y.
Concentration of complex lead-zinc-silver ores.

The Deister Concentrator Co., 901 Glasgow Avenue, Fort Wayne, Ind.
Recovery of metals from foundry residue and other waste materials.

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The Dorr Co., 247 Park Avenue, New York, N. Y.
The concentration of iron ore by flotation.

Ford Motor Co., Dearborn, Mich.
Beneficiation of low-grade specular iron ore.

General Electric Vapor Lamp Co., 410 Eighth Street, Hoboken, N. J.
The use of ultra-violet light to produce fluorescence and phosphorescence in minerals as an indicator of the degree of separation effected during beneficiation.

Harvard University, Cambridge, Mass.
Factors affecting the separation of lead and zinc sulphides from complex lead-zinc ores.

University of Kentucky, Department of Mining and Metallurgy, Lexington, Ky.
Separation by flotation of lead and zinc sulphides from barytes in typical Kentucky ores of such type.

Koppers-Rheolaveur Co., 1150 Koppers Building, Pittsburgh, Pa.
Float-and-sink tests with heavy liquids on various types of iron ore from the Mesabi and other ranges in the Lake Superior district.
The application of Rheolaveur concentration principles to the beneficiation of iron ores.
Float-and-sink tests on lead and zinc ores, particularly from the Tri-State district.
The application of Rheolaveur principles of concentration to the ores of the Tri-State district.

Michigan College of Mining and Technology, Houghton, Mich.
Recovery of greater percentages of metallic copper from rock and sands.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
The Sweet-Adams launder classifier.
Amygdaloidal tailing reclaimation.
Flotation of copper.
Reclamation of zinc chats.
Beneficiation of Michigan low-grade iron ores.
Beneficiation of high-sulphur iron ores.
Direct reduction and beneficiation of iron ores.
The Kloman specular iron beneficiation.
Beneficiation of iron ore in the Iron River and Crystal Falls districts.
Classification of Michigan iron ores.
Magnetic and electrostatic investigations.

Missouri School of Mines and Metallurgy (in cooperation with Tri-State Zinc and Lead Ore Producers Association), Rolla, Mo.
Balance between grinding and flotable mineral recovery of Tri-State zinc ores.

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Missouri School of Mines and Metallurgy (in cooperation with the United States Bureau of Mines, Rolla, Mo.
Improvements in the milling of southeast Missouri lead ores.
Lead losses in flotation of ores from oxidized seams in southeast Missouri lead mines.
Improvement of milling practice in the Tri-State zinc district.
Development of alternating-current magnetic separators.
Beneficiation of complex sulphide ores of the Pecos Valley mine, Glorietta, N. Mex.
Sampling and beneficiation of manganese ores.
Concentration of Lake Superior iron ores.

Missouri State Mining Experiment Station, Missouri School of Mines and Metallurgy, Rolla, Mo.
Determining the minimum amount of sodium cyanide necessary to produce a maximum depressive effect on pyrite when concentrating a galena-pyrite ore by flotation.
Beneficiating an old lead-silver-zinc-pyrite ore dump with mine-run ore and concentrating the values by flotation.

Montana State School of Mines, State Bureau of Mines and Geology, Butte, Mont.
Critical microscopic investigation of Anaconda mill products.
The differential flotation of copper and zinc sulphides.
The differential flocculation of copper, nickel, and iron sulphides.
Selective flotation of galena from chalcocite.

National City Chemical Co., Box G, National City, Calif.
Wet concentrators for the separation of gold from clayey material and for the separation of gold from gravels heavy in black sands.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Dewatering of iron concentrates by filtration and drying during filtration.

Oregon State Agricultural College, School of Mines, Corvallis, Oreg.
Beneficiation of chrome-ore minerals of Oregon.

Oriental Consolidated Mining Co. (in cooperation with the United States Bureau of Mines), 15 William Street, New York, N. Y.
Recovery of gold from refractory pyrite or base-metal ores.

Rensselaer Polytechnic Institute, Troy, N. Y.
Improvements in the separation of iron and copper in nickel ores.

Stanford University, Stanford University, Calif.
The concentration of chromite.

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Superior Zinc Corporation, Bristol, Pa.
Beneficiation of chlorine-bearing zinc materials to fit them for a wider market and at a better price.

Tennessee Copper Co., Copperhill, Tenn.
Flotation of manganese ores.

Tri-State Zinc and Lead Ore Producers Association (in cooperation with the Missouri School of Mines and Metallurgy), Box 95, Miami, Okla.
Balance between grinding and floatable mineral recovery of Tri-State zinc ores.

The Twining Laboratories, 2527 Fresno Street, Fresno, Calif.
Concentration of chromite.

United States Bureau of Mines, Intermountain Experiment Station (in cooperation with the University of Utah), Salt Lake City, Utah.
Flotation of jarosites.

United States Bureau of Mines, Mississippi Valley Experiment Station (in cooperation with the Missouri School of Mines and Metallurgy), Rolla, Mo.
Development of alternating-current magnetic separators.
Beneficiation of complex sulphide ores of the Pecos Valley mine, Glorietta, N. Mex.
Sampling and beneficiation of manganese ores.
Improvements in the milling of southeast Missouri lead ores.
Lead losses in flotation of ores from oxidized seams in southeast Missouri lead mines.
Improvement of milling practice in the Tri-State zinc district.
Concentration of Lake Superior iron ores.

United States Bureau of Mines, Rare and Precious Metals Experiment Station (in cooperation with the University of Nevada), Reno, Nevada.
Precious metal loss in present milling practice.

United States Bureau of Mines, Rare and Precious Metals Experiment Station (in cooperation with the Oriental Consolidated Mining Co.), Reno, Nev.
Recovery of gold from refractory pyrite or base-metal ores.

United States Bureau of Mines, Southern Experiment Station (in cooperation with the University of Alabama), Tuscaloosa, Ala.
Gravity concentration of the high-lime, red iron ores of the Chattanooga district.

Utah Copper Co., Garfield, Utah.
Crushing, screening, grinding, classifying, and separating minerals by flotation.
Developing flotation reagents.

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University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research, Salt Lake City, Utah.
Flotation of chalcopyrite.
Flotation of carbonates and silicates of copper.
Flotation of carbonates and sulphates of lead.
Flotation of sphalerite.
The separation of sphalerite from pyrite and pyrrhotite.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research (in cooperation with the United States Bureau of Mines), Salt Lake City, Utah.
Flotation of jarosites.

University of Wisconsin, Department of Mining and Metallurgy, Madison, Wis.
Flotation of the southwest Wisconsin zinc ores.

III. Methods of Analysis and Test

Aluminum Industries (Inc.), 2416-38 Beekman Street, Cincinnati, Ohio.
Methods of analysis of aluminum alloys.

American Chain Co., (Inc.), Bridgeport, Conn.
Nondestructive testing of steel.

American Foundrymen's Association (in cooperation with the United States Bureau of Standards), 222 West Adams Street, Chicago, Ill.
Development of a method of measuring liquid shrinkage of cast metals.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and 13 manufacturers), 29 West 39th Street, New York, N. Y.
Development of comparative high-temperature short-time tension tests.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Accelerated corrosion tests.
Accelerated tests for protective coatings.
Development of electrical and mechanical tests of heating and resistance alloys.
Development of life test for durability of electrical-resistance wire at high temperatures.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and 13 manufacturers), 1315 Spruce Street, Philadelphia, Pa.
Development of comparative high-temperature short-time tension tests.

American Society for Testing Materials (in cooperation with the Union Carbide and Carbon Corporation), 1315 Spruce Street, Philadelphia, Pa.
Bend test for metals.

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American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Corrosion tests for galvanized materials.

University of Arizona (in cooperation with the United States Bureau of Mines), Tucson, Ariz.
The magnetic balance for determining magnetite.

Babcock & Wilcox Co., 85 Liberty Street, New York, N. Y.
Methods of testing welds.

Barber-Colman Co., Rockford, Ill.
Improvements in methods of measuring hardness.

Cadillac Motor Car Co., Detroit, Mich.
Method of measuring electroplated coatings.
Rapid method of quantitative analysis of structural metals and materials.

California Institute of Technology, Department of Mechanics, Pasadena, Calif.
Investigation to determine whether Shore scleroscope would show different rebounds for specimens under stress and specimens not under stress.

University of California, Department of Mining and Metallurgy, Berkeley, Calif.
Tests of and improvements upon the methods of assaying bismuth.

College of the City of Detroit, Department of Chemistry, 4841-Cass Avenue, Detroit, Mich.
Analysis of barium metals.

General Electric Co., Schenectady, N. Y.
Tests of metal arc welds.
Classification and physical tests for various types of welded-plate joints.

L. F. Grammes & Sons (Inc.), 350 Union Street, Allentown, Pa.
Etching ferrous and nonferrous metals.

University of Illinois, Urbana, Ill.
Study of the Ikeda (electrical resistance) short-time test for fatigue strength of metals.

Iowa State Highway Commission, Ames, Iowa.
Development of a wear test for metals.

Massachusetts Institute of Technology, Cambridge, Mass.
Examination of welds by the X-ray diffraction method.

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Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
Structural examination of metals by means of the X-ray.
Analytical determination of platinum-group metals.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
X-ray examinations of castings.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
Application of X-rays in the study of various metallurgical problems.

National Slag Association, 937 Leader Building, Cleveland, Ohio
Development and standardization of test methods for slag and its products.

University of Pittsburgh, School of Mines, Department of Metallurgy, Pittsburgh, Pa.
Scratch hardness testing of metals.

Public Service Electric & Gas Co., Newark, N. J.
Development of fatigue-testing machine for bolt material.

Rensselaer Polytechnic Institute, Troy, N. Y.
The analytical determination of cadmium in the presence of zinc.
Radiographic examination of castings and various structures.
Crystal analyses of alloys.

Sperry Development Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
Nondestructive test of welds by electric-resistance method.

Stevens Institute of Technology, Hoboken, N. J.
Photomicrography of metals.

Union Carbide & Carbon Corporation, Research Laboratory, Thompson Avenue and Manley Street, Long Island City, N. Y.
Nondestructive testing of welds by means of the stethoscope and X-ray.

Union Carbide and Carbon Corporation, Research Laboratories (in cooperation with the American Society for Testing Materials), Long Island City, N. Y.
Bend test for metals.

United States Bureau of Mines, Intermountain Experiment Station (in cooperation with the University of Utah), Salt Lake City, Utah.
Development of microchemical methods by which the minerals of lead-silver may be identified.

United States Bureau of Mines, Southwest Experiment Station (in cooperation with the University of Arizona), Tucson, Ariz.
Chemical methods of mineralogical analysis of copper ores and products.
The magnetic balance for determining magnetite.

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United States Bureau of Standards, Washington, D. C.
Metallographic polishing technique.
X-ray methods for determining the crystal structure of metals.
Development and improvement of methods for the chemical analysis of zinc and manganese ores, brasses, bronzes, bearing metals, light aluminum alloys, zinc-base die-casting alloys, iron ores, cast irons, steels, ferroalloys, and alloy steels.
Study of "A_2" in iron by the beta-ray spectrometer.
Pyrometry of ferrous metals.
Laboratory corrosion test methods for stainless steels.
The utility of the spark test for the rapid identification of steels.
Methods of analysis of silver plating.
Methods of analysis of the metals of the platinum group.
A quantitative method for the determination of corrosive elements in petroleum products and liquid fuels.

United States Bureau of Standards (in cooperation with the American Foundrymen's Association), Washington, D.C.
Development of a method of measuring liquid shrinkage of cast metals.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion tests for galvanized materials.

United States Naval Research Laboratory, Bell, Md.
Use of gamma ray for examining welds.

United States Navy, Watertown Arsenal, Watertown, N. Y.
X-ray examination of welds.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Electromagnetic analysis and testing.
Measurement of high temperatures.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research (in cooperation with the United States Bureau of Mines), Salt Lake City, Utah.
Development of microchemical methods by which the minerals of lead-silver may be identified.

Wappler Electric Co., (Inc.), 162 Harris Avenue, Long Island City, N. Y.
Methods and apparatus for X-ray study of metal powders, minerals, etc.

West Virginia State College, Institute, W. Va.
Identification of aluminum, manganese, tin, and zinc by the use of organic reagents.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Weld testing by measurement of magnetic potentials.
Magnetic testing of butt welds.

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IV. Properties: Thermal, Electrical, and Magnetic

AC Spark Plug Co., Flint, Mich.
Magnetic properties of ferrous alloys.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Coefficient of expansion of special steels.

Allis-Chalmers Manufacturing Co. (in cooperation with the University of Michigan), Milwaukee, Wis.
Creep-test analysis at elevated temperature on materials suitable for large stationary and rotating structures.
Intermittent creep tests of 500 pounds per square inch at 850° F. for 2,000 hours on forged and cast steels.

American Engineering Co., Philadelphia, Pa.
Effect of high-temperature preheated air on expansion of stoker parts.

American Hammered Piston Ring Co., Box 758, Baltimore, Md.
Improvement of structure of metals to give heat resistance and heat conductivity.

American Manganese Steel Co., 6600 Ridge Avenue, St. Louis, Mo.
Development of heat-resisting alloys of nickel and chromium.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials, Battelle Memorial Institute, and the Engineering Foundation), 29 West 39th Street, New York, N. Y.
Effect of temperature on the properties of metals.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and the Battelle Memorial Institute), 29 West 39th Street, New York, N. Y.
Creep of metals at elevated temperatures.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and the University of Illinois), 29 West 39th Street, New York, N. Y.
Fatigue tests on a low-carbon steel at high temperatures.
Effect of temperature upon the fatigue or endurance properties of metals.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and 13 manufacturers), 29 West 39th Street, New York, N. Y.
Comparative high-temperature short-time tension tests.

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American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and various industrial laboratories), 29 West 39th Street, New York, N. Y.
Development of a test code for high-temperature tensile and creep tests.
High-temperature effects on mechanical properties and structural stability of cast, wrought, and stainless steel.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Development of electrical and mechanical tests of heating and resistance alloys.
Development of life test for durability of electrical-resistance wire at high temperatures.
Study of magnetic properties of steel and their correlations with other properties and with general performance.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers), 1315 Spruce Street, Philadelphia, Pa.
Effect of temperature on the properties of metals.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and the Battelle Memorial Institute), 1315 Spruce Street, Philadelphia, Pa.
Creep of metals at elevated temperatures.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and the University of Illinois), 1315 Spruce Street, Philadelphia, Pa.
Fatigue tests on a low-carbon steel at high temperatures.
Effect of temperature upon the fatigue or endurance properties of metals.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and 13 manufacturers), 1315 Spruce Street, Philadelphia, Pa.
Comparative high-temperature short-time tension tests.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and various industrial laboratories), 1315 Spruce Street, Philadelphia, Pa.
Development of a test code for high-temperature tensile and creep tests.
High-temperature effects on mechanical properties and structural stability of cast, wrought, and stainless steel.

University of Arizona (in cooperation with the United States Bureau of Mines), Tucson, Ariz.
The magnetic balance for determining magnetite.

Automatic Electric (Inc.), 1027 West Van Buren Street, Chicago, Ill.
Characteristics of electromagnetic iron and permanent magnet steels.

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Babcock & Wilcox Co. (in cooperation with the Massachusetts Institute of Technology), 85 Liberty Street, New York, N. Y.
Flow of steel at high temperatures.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Comprehensive study of the properties of cast irons with a view to developing iron of superior quality, especially with reference to properties at elevated temperatures.
Thermal properties of metals.
Low-temperature properties of aircraft materials, including fatigue, impact, tensile properties, etc.

Battelle Memorial Institute (in cooperation with the American Society of Mechanical Engineers), 505 King Avenue, Columbus, Ohio.
Effect of temperature on the properties of metals.

Battelle Memorial Institute (in cooperation with the American Society for Testing Materials and the American Society of Mechanical Engineers), 505 King Avenue, Columbus, Ohio.
Creep of metals at elevated temperatures.

The Calorizing Co., 400 Hill Street, Wilkinsburg, Pa.
Development of alloys for resistance to corrosion at elevated temperatures and high strength of materials at elevated temperatures.

Carnegie Institute of Technology, Bureau of Metallurgical Research, Schenley Park, Pittsburgh, Pa.
Recrystallization of metals after cold-working and heating.
Thermal characteristics of steels.

Cochrane Corporation, 17th Street Below Allegheny Avenue, Philadelphia, Pa.
Cast iron to resist temperatures up to 750° F.

Crane Co. Laboratory, 836 South Michigan Avenue, Chicago, Ill.
Long-time tension tests of steels at elevated temperatures.

Detroit Edison Co. (in cooperation with the University of Michigan), 2000 Second Avenue, Detroit, Mich.
Metals at elevated temperatures for use in power service.

The Engineering Foundation (in cooperation with the American Society of Mechanical Engineers), 29 West 39th Street, New York, N. Y.
Effect of temperature on the properties of metals.

General Electric Co., 1 River Road, Schenectady, N. Y.
Magnetic properties of Ni-Fe alloys.

General Electric Company, Research Laboratory, Schenectady, N. Y.
The high-temperature properties of steels.
Characteristics of various steels under torsion and at elevated temperatures.

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Harvard University, Cambridge, Mass.
Steel at elevated temperatures.
X-ray investigation of the stability of austenitic steels at low and high temperature.

University of Illinois, Urbana, Ill.
Fatigue tests of steel at elevated temperatures.

University of Illinois (in cooperation with the American Society of Mechanical Engineers and the American Society for Testing Materials), Urbana, Ill.
Fatigue tests on a low-carbon steel at high temperatures.
Effect of temperature upon the fatigue or endurance properties of metals.

The Lunkenheimer Co., Cincinnati, Ohio.
Study of properties of metals at elevated temperatures.

Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
Magnetic properties of iron-carbon alloys as a means of studying critical changes.
Heat-resisting steels.

Massachusetts Institute of Technology, Department of Physics, Cambridge, Mass.
Thermal conductivity of metals at high temperatures.

Massachusetts Institute of Technology, Department of Physics, in cooperation with the Babcock & Wilcox Co.), Cambridge, Mass.
Flow of steel at high temperatures.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Corelations of copper conductivity.

University of Michigan, Ann Arbor, Mich.
Strength of ductile materials subjected to shear at elevated temperatures.
Physical properties of American Society for Testing Materials grades A and B seamless steel boiler pipes at 850° F.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Effect of temperature on tensile strength of lead.
Alloys at elevated temperatures.
Thermal conductivity of certain alloys.
Thermal expansion of brass.
Thermal expansion of steel.
Thermal conductivity of steel.
Study of the strength and related properties of ferrous and nonferrous metals at elevated temperatures.

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University of Michigan (in cooperation with Allis-Chalmers Manufacturing Co.), Ann Arbor, Mich.
Creep-test analysis at elevated temperature on materials suitable for large stationary and rotating structures.
Intermittent creep tests of 500 pounds per square inch at 850° F. for 2,000 hours on forged and cast steels.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Metals at elevated temperatures for use in power service.

The Midvale Co., Nicetown, Philadelphia, Pa.
Magnetic properties of steel.
Effect of temperature on physical properties of steel.
Properties of metals at high temperatures.

Montana State School of Mines, Butte, Mont.
The electrical conductivity of cold-drawn and annealed metals and alloys.

Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y.
Effect of arsenic on some physical and electrical properties of iron.
Effect of original grain size of low-carbon steel on tensile properties at elevated temperatures.
Effect of frequency on the fatigue limit of steel by rise in temperature and increase in electrical resistance.

Polytechnic Institute of Brooklyn, Department of Civil Engineering, 99 Livingston Street, Brooklyn, N. Y.
Investigation of the torsional strength of metals at high temperature.

Rensselaer Polytechnic Institute, Troy, N. Y.
Thermal conductivity of the ores of iron-nickel alloys.
Electrical resistances and temperature coefficients of metals and alloys.
Thermal conductivity of metals and alloys by a dynamic method.
Investigation of the torsional strength of the metals at high temperatur
Electrical conductance, microstructure, and expansion of duriron alloys.
Thermal e.m.f. of alloys.
Magnetic properties of iron-chromium alloys.

Russell Electric Co., 340 West Huron Street, Chicago, Ill.
Chemical inertness, thermal conductivity, dielectric strength, and insulation resistance at elevated temperatures.

United States Bureau of Mines, Southwest Experiment Station (in cooperation with the University of Arizona), Tucson, Ariz.
The magnetic balance for determining magnetite.

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United States Bureau of Standards, Washington, D. C.
Effect of temperature on properties of metals.
Thermal conductivity of metals.
Compression properties and impact resistance of metals at high temperatures.
Determination of melting or freezing points of pure metals.
Properties of building materials at high temperatures.
Study of heat-resisting alloys.
The compressive strength and deformation of structural steel and cast-iron shapes at high temperatures.
Flow characteristics of iron-nickel and chromium alloys and steels under load at elevated temperatures.
Fire tests of welded-steel floor construction.
Melting point of ferrous metals, including iron.
Thermal properties of pure thorium.
Primary standard of light and the melting point of platinum.
Thermoelectric properties of pure metals.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Measurement of high temperatures.
Rate of transformation of steels at various temperatures.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
Thermoelectric properties of silicon - copper alloys.
Thermoelectric properties of beryllium.

Yale University, Sloane Physics Laboratory, New Haven, Conn.
Magnetic properties of manganese as affected by purity and crystal structure.
Magnetic lag in iron (not due to eddy currents).

V. Properties: Corrosion, Erosion, and Embrittlement

General

American Hammered Piston Ring Co., Box 758, Baltimore, Md.
Improvement of structure of metals to give wear resistance and corrosion resistance.

American Manganese Steel Co., 6600 Ridge Avenue, St. Louis, Mo.
Corrosion-resisting alloys of nickel and chromium.
Resistance of 12 Ni-Cr alloys to acids of different concentrations at different temperatures.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Corrosion of crude-oil storage tanks.

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American Society of Mechanical Engineers (in cooperation with Brooklyn Edison Co.), 29 West 39th Street, New York, N. Y.
Effect of air and of turbulence on condenser-tube deterioration.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Accelerated corrosion tests.
Atmospheric-corrosion tests of metallic-coated products.
Atmospheric-corrosion tests of uncoated sheets.
Total immersion tests on uncoated sheets.
Metal culvert corrosion tests.

American Society for Testing Materials (in cooperation with Battelle Memorial Institute), 1315 Spruce Street, Philadelphia, Pa.
Embrittlement of hot-dipped galvanized structural steel.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Corrosion tests of galvanized materials.
Relative life of various screen wire cloths.

Battelle Memorial Institute (in cooperation with the American Society for Testing Materials), 505 King Avenue, Columbus, Ohio.
Embrittlement of hot-dipped galvanized structural steel.

S. F. Bowser & Co. (Inc.), Fort Wayne, Ind.
Determining metals best suited for handling and storage of various liquids such as all petroleum products, chemicals, and food products.

Brooklyn Edison Co. (Inc.), 380 Pearl Street, Brooklyn, N. Y.
Causes and prevention of condenser-tube corrosion and influence on heat transfer.

Brooklyn Edison Co. (Inc.), (in cooperation with the American Society of Mechanical Engineers), 380 Pearl Street, Brooklyn, N. Y.
Effect of air and of turbulence on condenser-tube deterioration.

Cadillac Motor Car Co., Detroit, Mich.
Development of methods and materials for quickly and economically producing nitrided parts to resist wear and corrosion.

California Agricultural Experiment Station, College of Agriculture, Davis, Calif.
Bearing wear as affected by the character and condition of the lubricant, especially crank case-oil filters and their effect on engine wear.

The Calorizing Co., 400 Hill Avenue, Wilkinsburg, Pa.
Application of aluminum metal to surface of other metals as steel, copper, and alloys for protection of base metal against corrosion at elevated temperatures.
Development of alloys for resistance to corrosion at elevated temperatures, and high strength of materials at elevated temperatures.

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Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
A study of metals to withstand various services, such as attack by refrigerants in the presence of water, by the condensate from manufactured gas, by steam condensate and by a wide variety of vapors and liquids found in the atmosphere in processes requiring air conditioning. This includes extended corrosion tests, scale observations and physical tests.
Rust inhibitors and neutralizers for addition to water.

Cast Iron Pipe Research Association (in cooperation with the United States Bureau of Standards), 566 Peoples Gas Building, Chicago, Ill.
Causes of soil corrosion of metal pipe.

Dearborn Chemical Co., 1029 West 35th Street, Chicago, Ill.
Prevention and control of corrosion.

Duquesne Light Co., Pittsburgh, Pa.
Turbine-blade erosion.
Condenser-tube corrosion.

The Duriron Co. (Inc.), Dayton, Ohio.
Use of acid-resisting materials.

Humble Oil & Refining Co., Houston, Tex.
General study of corrosion, not only of tankage where the corrosion is caused mainly by hydrogen sulphide, but also of the equipment in which the processing of the crude is carried out.
Methods of prevention of corrosion of crude tankage due to the presence of hydrogen sulphide and other sulphur compounds.

Iowa State Highway Commission, Ames, Iowa.
Development of a wear test for metals.

Johns Hopkins University, Baltimore, Md.
The corrosion of pipe by hot water.

Robert W. Hunt Co., 166 West Van Buren Street, Chicago, Ill.
Corrosion of pipe.

Hupp Motor Car Corporation, Detroit, Mich.
Corrosion of cooling systems.

Jackson Engineering Corporation, 11 East Fifth Avenue, Tulsa, Okla.
Selection of metals to resist corrosion of hot hydrogen sulphide solutions of triethanolamine and water.

Lehigh University, Department of Metallurgical Engineering, Bethlehem, Pa.
Protective values of cadmium and zinc platings against corrosion-fatigue of steel.

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The Lunkenheimer Co., Cincinnati, Ohio.
Corrosion in industrial applications.
Development of new alloys to meet conditions of corrosion, wear resistance, and strength in the most economical manner.

McCord Radiator Manufacturing Co., Detroit, Mich.
Development of most economical metal and one most resistant to electrolysis or corrosion.

Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
Wear resistance of metals.

Metals Coating Co. of America, 497 North 3d Street, Philadelphia, Pa.
Corrosion protection by sprayed molten metal coatings.

University of Michigan, Ann Arbor, Mich.
Studies of caustic embrittlement failures.

The Midvale Co., Nicetown, Philadelphia, Pa.
Wear resistance.
Resistance to corrosion and oxidation.

Montana State College of Agriculture and Mechanic Arts, Engineering Experiment Station, Bozeman, Mont.
The corrosion of automobile engines by sulphur compounds in gasoline.

New York Edison System, 4 Irving Place, New York, N. Y.
Condenser-tube deterioration.
Experiments to increase life of condenser tubes at Hell Gate station.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.
Pipe corrosion.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, Calif.
Electrolysis prevention by means of an imposed countercurrent.

Pennsylvania Water & Power Co., Lexington Street Building, Baltimore, Md.
Study of metals to resist corrosive action of water for submerged parts of water turbine.

Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Corrosion during heat treatment of metals.

Public Service Electric & Gas Co., Newark, N. J.
Caustic-embrittlement studies in connection with plant equipment.
Study on corrosion of condenser tubes due to air liberated from circulating water.
Studies of electrolytic corrosion.

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Rensselaer Polytechnic Institute, Troy, N. Y.
Corrosion of alloys.

Robertshaw Thermostat Co., Youngwood, Pa.
Corrosive action of gas and heat on metals.

Henry Souther Engineering Co., Hartford, Conn.
Research on corrosion-resistant material for valve bodies and trim.

United Gas Improvement Co., 3101 Passyunk Avenue, Philadelphia, Pa.
General research on condenser tubes.
Corrosion of welded joints.

United States Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.
Study of tank corrosion.

United States Bureau of Standards, Washington, D. C.
Aeration factor in submerged corrosion.
A quantitative method for the determination of corrosive elements in petroleum products and liquid fuels.
The relation of corrosion and fatigue of metals.
Fundamental principles of the wear abrasion of materials.
Resistance of metals suitable for dies to the abrasive action of plastic clay.

United States Bureau of Standards (in cooperation with the American Electro-Platers Society), Washington, D. C.
Corrosion tests of plated deposits on ferrous metals.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion tests for galvanized materials.
Exposure tests of screen wire cloth.

United States Bureau of Standards (in cooperation with the Cast Iron Pipe Research Association), Washington, D. C.
Causes of soil corrosion of metal pipe.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
Erosion of turbine-blading materials by steam.
Behavior of condenser tubes under simulated service conditions.
Effect of stress, time, and number of cycles in causing penetration of metal under corrosion.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Investigations on corrosion.

Westinghouse Electric & Manufacturing Co., South Philadelphia Works, South Philadelphia, Pa.
Determination of resistance of various materials to erosion.

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White Eagle Oil Corporation, 1400 Federal Reserve Bank Building, Kansas City, Mo.
Corrosion and erosion in refining equipment.

Ferrous

Allegheny Steel Co. (in cooperation with the American Society for Testing Materials), Brackenridge, Pa.
Corrosion tests of stainless steels.

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Value of gray cast iron under conditions of sliding friction.
Wearing test of chilled cast iron under conditions of impact and abrasion.

American Chain Co. (Inc.), Bridgeport, Conn.
Resistance to corrosion and abrasion of carbon and alloy steels.

American Electro-Platers Society (in cooperation with the United States Bureau of Standards), 434 South Wabash Avenue, Chicago, Ill.
Corrosion tests of plated deposits on ferrous metals.

American Society for Testing Materials (in cooperation with the Battelle Memorial Institute and the Utilities Research Commission, Incorporated), 1315 Spruce Street, Philadelphia, Pa.
Causes of embrittlement in steel.

American Society for Testing Materials (in cooperation with 16 industrial and governmental laboratories), 1315 Spruce Street, Philadelphia, Pa.
Corrosion tests of stainless steels.

Armour Institute of Technology, Department of Chemical Engineering, 3300 Federal Street, Chicago, Ill.
Causes of boiler-tube corrosion on the gas side, and methods of preventing the same.

Battelle Memorial Institute (in cooperation with the American Society for Testing Materials and the Utilities Research Commission, Incorporated), 505 King Avenue, Columbus, Ohio.
Causes of embrittlement in steel.

Bell Telephone Laboratories (in cooperation with the American Society for Testing Materials), 463 West Street, New York, N. Y.
Corrosion tests of stainless steels.

Bethlehem Steel Co. (in cooperation with the American Society for Testing Materials), Bethlehem, Pa.
Corrosion tests of stainless steels.

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A. M. Byers Co., Pittsburgh, Pa.
Corrosion of steel.

Cadillac Motor Car Co., Detroit, Mich.
Development of methods and materials for quickly and economically producing nitrided parts to resist wear and corrosion.

Carpenter Steel Co. (in cooperation with the American Society for Testing Materials), Reading, Pa.
Corrosion tests of stainless steels.

Chicago, Milwaukee, St. Paul & Pacific Railroad Co., Union Station Building, Chicago, Ill.
Reduction of pitting by feet-water heating.

Cochrane Corporation, 17th Street below Allegheny Avenue, Philadelphia, Pa.
Noncorrosive and non-oxidizing iron.

Crucible Steel Co. (in cooperation with the American Society for Testing Materials), Harrison, N. J.
Corrosion tests of stainless steels.

Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Investigation of boiler No. 28 Delray Power plant for evidence of caustic embrittlement.

Detroit Steel Products Co., West Grand Boulevard, Detroit, Mich.
Protection against corrosion of steel.

E. I. Du Pont de Nemours & Co. (in cooperation with the American Society for Testing Materials), Wilmington, Del.
Corrosion tests of stainless steels.

Electrolux Servel Corporation, 408 East 111th Street, New York, N. Y.
Steel corrosion by ammonia in refrigeration.

A. Finkl & Sons Co., 1326 Cortland Street, Chicago, Ill.
Production of a ferrous metal or alloy which will better withstand abrasion, fire cracking, and impact stresses and be highly machinable.

Firestone Steel Products Co., Akron, Ohio.
Corrosion of steel.

Frigidaire Corporation (in cooperation with the American Society for Testing Materials), Dayton, Ohio.
Corrosion tests of stainless steels.

General Electric Co., Research Laboratories, Schenectady, N. Y.
Endurance properties of steel in steam.
The corrosion fatigue of steels in steam.

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General Electric Co. (in cooperation with the American Society for Testing Materials), Schenectady, N. Y.
Corrosion tests of stainless steels.

General Motors Corporation (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Corrosion tests of stainless steels.

Hall Laboratories (Inc.), Pittsburgh, Pa.
Investigation of corrosion in district steam-heating mains.
Water conditioning and prevention of corrosion-scale formation and boiler-metal cracking in steam-generating stations.

Harvard University, Cambridge, Mass.
Corrosion of iron water pipes.
The occurrence of oxygen in iron and steel and its influence on hot brittleness.

University of Illinois, Urbana, Ill.
Control of boiler-water treatment to prevent embrittlement.

University of Illinois, Department of Industrial Chemistry, Urbana, Ill.
Prevention of corrosion by flue gas.

International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.
Corrosion-resistant ferrous metals.
Erosion-resistant materials and their treatments.

The International Nickel Co. (Inc.), Development and Research Department, 67 Wall Street, New York, N. Y.
Corrosion-resisting ferrous alloys.

Johns Hopkins University, Baltimore, Md.
Corrosion of wrought iron and steel pipe under service conditions.

Lebanon Steel Foundry, Lebanon, Pa.
Corrosion, erosion, and heat-resistant cast steels for all phases of oil distillation and cracking.
Corrosion-resisting cast steels for service exposed to mine water.

Lion Oil Refining Co., El Dorado, Ark.
Prevention of corrosion in condenser tubes of pipe still.

Midvale Steel Co. (in cooperation with the American Society for Testing Materials), Philadelphia, Pa.
Corrosion tests of stainless steels.

Minneapolis General Electric Co., Minneapolis, Minn.
Study of factors involved in development of caustic embrittlement of boiler steel.

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New York Edison System, 4 Irving Place, New York, N. Y.
Study of corrosion resistance for chromium-steel alloy used in switch mechanisms.

Parker Rust Proof Co., 2177 East Milwaukee Avenue, Detroit, Mich.
Processes for the treatment of iron and steel to prevent corrosion.

Republic Steel Co. (in cooperation with the American Society for Testing Materials), Massillon, Ohio.
Corrosion tests of stainless steels.

Rose Polytechnic Institute, Terre Haute, Ind.
Corrosion in high-pressure (150 lb.) gas lines.

Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Corrosion of rustproof steel castings.

Tubize-Chatillon Corporation, Rome, Ga.
Resistance of iron alloys to corrosion by acetic acid and mixtures containing salts.

Union Carbide & Carbon Corporation, Research Laboratory (in cooperation with the American Society for Testing Materials), Long Island City, N. Y.
Corrosion tests of stainless steels.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion tests of stainless steels.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
Corrosion tests of stainless steels.
The effects of variable amounts of oxygen in water on the corrosion-fatigue limit of boiler steel.

United States Naval Research Laboratory, Bureau of Engineering (in cooperation with the American Society for Testing Materials), Anacostia, D. C.
Corrosion tests of stainless steels.

United States Navy, Bureau of Construction and Repair (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion tests of stainless steels.

Utilities Research Commission (Inc.), (in cooperation with the American Society for Testing Materials and the Battelle Memorial Institute), 72 West Adams Street, Chicago, Ill.
Causes of embrittlement in steel.

Walworth Alabama Company, Attalla, Ala.
Corrosion of cast iron and alloyed cast iron.

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Walworth Co., Statler Building, Boston, Mass.
Ferrous alloys for high pressures and temperatures and resistant to chemicals.

Westinghouse Electric & Manufacturing Co. (in cooperation with the American Society for Testing Materials), East Pittsburgh, Pa.
Corrosion tests of stainless steels.

West Virginia State Highway Department, Charleston, W. Va.
Accelerated corrosion tests on culvert pipe of concrete, cast-iron, and corrugated-iron pipe with different coatings.

Worcester Polytechnic Institute, Department of Chemistry, Worcester, Mass.
Corrosion of chrome-nickel steel.

Nonferrous

Aluminum Co. of America (in cooperation with the American Society for Testing Materials), New Kensington, Pa.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

The American Brass Co., Waterbury, Conn.
The relative corrosion of copper, copper alloys, and other metals.

American Brass Co. (in cooperation with the American Society for Testing Materials), Waterbury, Conn.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3 and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc base alloys with exposure-test data.

American Can Co., Research Department, 11th Avenue and St. Charles Road, Maywood, Ill.
The corrosion of tin plate by food products.

American Chain Co. (Inc.), Bridgeport, Conn.
Resistance to corrosion and erosion of nonferrous alloys.

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American Manganese Bronze Co. (in cooperation with the American Society for Testing Materials), Holmesburg, Philadelphia, Pa.
Corrosion of nonferrous metals and alloys in liquids.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Exposure tests on nonferrous metals and alloys.

American Society for Testing Materials (in cooperation with 14 university, industrial and governmental laboratories), 1315 Spruce Street, Philadelphia, Pa.
Atmospheric corrosion of nonferrous metals and alloys.
Corrosion of nonferrous metals and alloys in liquids.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.

American Society for Testing Materials (in cooperation with 16 industrial and governmental laboratories), 1315 Spruce Street, Philadelphia, Pa.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

Bell Telephone Laboratories (Inc.) (in cooperation with the American Society for Testing Materials), New York, N. Y.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

Bond Manufacturing Corporation, Monroe and 5th Street, Wilmington, Del.
Corrosion problems of tin and lead collapsible tubes.

Bridgeport Brass Co. (in cooperation with the American Society for Testing Materials), Bridgeport, Conn.
Corrosion of nonferrous metals and alloys in liquids.

Bunting Brass & Bronze Co. (in cooperation with the United States Bureau of Standards), Toledo, Ohio.
Dry wear testing of bronze alloys.
Lubricated wear testing of bronze alloys.

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University of California (in cooperation with the American Society for Testing Materials), Berkeley, Calif.
Atmospheric corrosion of nonferrous metals and alloys.

Central Arizona Light & Power Co. (in cooperation with the American Society for Testing Materials), Phoenix, Ariz.
Atmospheric corrosion of nonferrous metals and alloys.

Continental Can Co. (Inc.), Research Department, 4633 West Grand Avenue, Chicago, Ill.
Corrosion of tin plate.
Perforation of tin containers packed with acid foods.
Discoloration of tin plate by decomposition of products during processing of canned foods.
Chemical composition and physical condition of tin plate with respect to its service value in food containers.

Duquesne Light Co. (in cooperation with the American Society for Testing Materials), Pittsburgh, Pa.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

Duriron Co. (in cooperation with the American Society for Testing Materials), Dayton, Ohio.
Corrosion of nonferrous metals and alloys in liquids.

General Electric Co. (in cooperation with the American Society for Testing Materials), West Lynn, Mass.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

General Motors Research Corporation (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Corrosion-resisting properties of die cast test specimens from 12 aluminum base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

General Motors Research Laboratories, General Motors Building, Detroit, Mich.
Development of bearing alloy with frictional quality of babbitt and possessing a high softening point.

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Harvard University, Cambridge, Mass.
Corrosion of copper and brass water pipes.

The Hoover Co. (in cooperation with the American Society for Testing Materials), North Canton, Ohio.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc base alloys with exposure test data.

International Lead Refining Co., 151st and McCook Avenues, East Chicago, Ind.
Corrosion of lead and lead alloys.

International Nickel Co. (in cooperation with the American Society for Testing Materials), New York, N. Y.
Corrosion of nonferrous metals and alloys in liquids.

Massachusetts Institute of Technology, Cambridge, Mass
Mechanism of electrolytic prevention of brass corrosion in steam condensers.

Massachusetts Institute of Technology (in cooperation with the American Society for Testing Materials), Cambridge, Mass.
Corrosion of nonferrous metals and alloys in liquids.

National Advisory Committee for Aeronautics (in cooperation with the United States Bureau of Standards, the United States Army and the United States Navy), Washington, D. C.
Corrosion embrittlement of sheet duralumin.
Corrosion of magnesium and magnesium alloys.

National Lead Co., Research Laboratories, 105 York Street, Brooklyn, N. Y.
Corrosion and metallography of lead, tin, and/or antimony alloys.

National Lead Co. (in cooperation with the American Society for Testing Materials), Brooklyn, N. Y.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum base-alloys and 9 zinc-base alloys after 1, 3 and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

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The New Jersey Zinc Co. (in cooperation with the American Society for Testing Materials), Palmerton, Pa.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum base-alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

University of Notre Dame, Notre Dame, Ind.
Effect of small amounts of copper upon susceptibility of lead to corrosion by sulphuric acid.

Packard Motor Car Co. (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

Pennsylvania State College (in cooperation with the American Society for Testing Materials), State College, Pa.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

Pennsylvania Railroad Co. (in cooperation with the American Society for Testing Materials), Altoona, Pa.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

Rochester Gas & Electric Corporation (in cooperation with the American Society for Testing Materials), Rochester, N. Y.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

Southern Counties Gas Co., 810 South Flower Street, Los Angeles, Calif.
Copper pipe for natural-gas distribution systems in corrosive soils.

Stewart Die Casting Corporation (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum base-alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

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Stewart Die Casting Corporation-- Continued.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

Tubize-Chatillon Corporation, Rome, Ga.
Resistance of aluminum and its alloys to corrosion by acetic acid and sulphuric acid.
Resistance of copper alloys to corrosion by acetic acid and mixtures containing salts.

United States Army, Fort Hancock (in cooperation with the American Society for Testing Materials), Sandy Hook, N. J.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

United States Army (in cooperation with the United States Bureau of Standards, the United States Navy, and the National Advisory Committee for Aeronautics), Washington, D. C.
Corrosion embrittlement of sheet duralumin.
Corrosion of magnesium and magnesium alloys.

United States Army Air Corps (in cooperation with the American Society for Testing Materials), Dayton, Ohio.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years out-door exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

United States Bureau of Standards, Washington, D. C.
Corrosion problems arising in the use of sheet copper for roofing and flashings.
Investigation of the strnegth of the soldered seams of copper roofing and the corrosion of valley flashings.
Wear resistance and related properties of bearing bronzes.
Exposure tests of art bronzes.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.
Exposure tests on nonferrous metals and alloys.

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United States Bureau of Standards (in cooperation with the United States Army, the United States Navy, and the National Advisory Committee for Aeronautics), Washington, D. C.
Corrosion embrittlement of sheet duralumin.
Corrosion of magnesium and magnesium alloys.

United States Navy Department (in cooperation with the American Society for Testing Materials), Key West, Fla.
Galvanic and electrolytic corrosion of nonferrous metals and alloys.
Atmospheric corrosion of nonferrous metals and alloys.

United States Navy Yard, Material Branch (in cooperation with the American Society for Testing Materials), Washington, D. C.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

United States Navy (in cooperation with the United States Bureau of Standards, the United States Army, and the National Advisory Committee for Aeronautics), Washington, D. C.
Corrosion embrittlement of sheet duralumin.
Corrosion of magnesium and magnesium alloys.

Western Electric Co. (Inc.) (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Corrosion resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

Westinghouse Electric & Manufacturing Co. (in cooperation with the American Society for Testing Materials), East Pittsburgh, Pa.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

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White Motor Co. (in cooperation with the American Society for Testing Materials), Cleveland, Ohio.
Corrosion-resisting properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.
Correlation of accelerated corrosion tests of zinc-base alloys with exposure-test data.

VI. Properties: Failure, Endurance, Fatigue, and Crystal Structure

American Chain Co. (Inc.), Bridgeport, Conn.
Resistance to fatigue of carbon and alloy steels.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and the University of Illinois), 29 West 39th Street, New York, N. Y.
Effect of temperature upon the fatigue or endurance properties of metals.
Fatigue tests on a low-carbon steel at high temperature.

American Society of Mechanical Engineers (in cooperation with the United States Navy), 29 West 39th Street, New York, N. Y.
Tests on cylindrical structures subjected to collapse.

American Society of Mechanical Engineers (in cooperation with industrial laboratories), 29 West 39th Street, New York, N. Y.
Fatigue tests of springs.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers, and the University of Illinois), 1315 Spruce Street, Philadelphia, Pa.
Effect of temperature upon the fatigue or endurance properties of metals.
Fatigue tests on a low-carbon steel at high temperatures.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Endurance properties of special steels.
Low-temperature properties of aircraft materials, including fatigue, impact, tensile, and other properties.

Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.
Causes of chain breakage.

Carnegie Institute of Technology, Bureau of Metallurgical Research, Schenley Park, Pittsburgh, Pa.
Recrystallization in metals after cold-working and heating.

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Case School of Applied Science, University Circle, Cleveland, Ohio.
The effects of small amounts of cold work on the crystallization temperatures of type AA enduro steel (18 per cent Cr, low carbon).

University of Colorado, Boulder, Colo.
Effect of stressing steel encased in concrete above its yield point.

Detroit Edison Co. (in cooperation with the University of Michigan), 2000 Second Avenue, Detroit, Mich.
Causes of failures of boiler tubes.

Four Wheel Drive Auto Co., Clintonville, Wis.
Endurance properties of commercial malleable iron, as compared with straight-carbon cast steel.

General Electric Co., Research Laboratory, Schenectady, N. Y.
The relation, if any, of impact value to notched fatigue.
The corrosion fatigue of steels in steam.

Harvard University, Cambridge, Mass.
Metallographic investigation of rail failures.

University of Illinois, Urbana, Ill.
Fatigue tests of steel at elevated temperatures.
Determination of the general laws and phenomena of the fatigue of metals.
Study of the Ikeda (electrical resistance) short-time test for fatigue-strength of metals.

University of Illinois (in cooperation with the American Society of Mechanical Engineers and the American Society for Testing Materials), Urbana, Ill.
Fatigue tests on a low-carbon steel at high temperatures.

University of Illinois, Engineering Experiment Station (in cooperation with the American Society for Testing Materials and the American Society of Mechanical Engineers), Urbana, Ill.
Effect of temperature upon the fatigue or endurance properties of metals.

Lehigh University, Department of Metallurgical Engineering, Bethlehem, Pa.
Protective values of cadmium and zinc platings against corrosion-fatigue of steel.
Effect of hydrogen absorbed during pickling upon life of steel subjected to fatigue.
Corrosion-fatigue tests of welded joints.

University of Maine, Orono, Me.
Effect of repeatedly stressing metals beyond yield point, in torsion, and tension.

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Marquette University, College of Engineering, 1210 West Michigan Street, Wilwaukee, Wis.
Causes of failures in locomotive tires.

Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
The intercrystalline failure of metals.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Theory of metal recrystallization and effects of presence of impurities.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Causes of failures of boiler tubes.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
Grain growth in metals and alloys.

Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y.
Effect of frequency on the fatigue limit of steel by rise in temperature and increase in electrical resistance.

Public Service Electric & Gas Co., Newark, N. J.
Development of fatigue-testing machine for bolt material.

Purdue University, Lafayette, Ind.
Fatigue study.

Rensselaer Polytechnic Institute, Troy, N. Y.
Preparation of single crystals of metallic compounds.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Study of the relationship between cold working, annealing, and crystal size in brasses.

Stanford University, Stanford University, Calif.
Grain structure and cracks in chromium plating.

Union College, Schenectady, N. Y.
Properties of metallic single crystals.

United States Bureau of Standards, Washington, D. C.
Endurance limits of metals in axial loading and rotary bending.
Failure in service of heat-treated bridge wire.
Fatigue properties of duralumin coated with aluminum.
The relation of corrosion and fatigue of metals.
Crystal structure of metals by X-ray methods.

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United States Bureau of Standards (in cooperation with Yale University), Washington, D. C.
Fatigue properties of thin sheet duralumin for aircraft use.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
The effects of various degrees of cold working on stainless steels, especially the torsional fatigue properties when in the form of elliptical wire.
The effects of variable amounts of oxygen in water on the corrosion-fatigue limit of boiler steel.

United States Navy (in cooperation with the American Society of Mechanical Engineers), Washington, D. C.
Tests on cylindrical structures subjected to collapse.

State College of Washington, Pullman, Wash.
Fatigue tests of metals.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
Study of welded metals under fatigue tests.

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.
Fatigue tests of model turbine-generator rotors.
Fatigue and impact tests of welds.

Yale University (in cooperation with United States Bureau of Standards), Washington, D. C.
Fatigue properties of thin sheet duralumin for aircraft use.

VII. Properties: Other Mechanical

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Grinding tests on iron and alloys.
Wearing test of chilled cast iron under conditions of impact and abrasion.

Allis-Chalmers Manufacturing Co. (in cooperation with the University of Michigan), Milwaukee, Wis.
Intermittent creep tests of 500 pounds per square inch at 850° F. for 2,000 hours on forged and cast steels.
Creep-test analysis at elevated temperature on materials suitable for large stationary and rotating structures.
Separate single-load creep tests for each load arrived at in increments of loading in the original creep tests.

Aluminum Co. of America (in cooperation with the American Society for Testing Materials), New Kensington, Pa.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

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American Brass Co. (in cooperation with the American Society for Testing Materials), Waterbury, Conn.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3 and 5 years outdoor exposure at 6 places and indoor exposure at 4.

American Cast Iron Pipe Co. (in cooperation with the American Society for Testing Materials), Birmingham, Ala.
Chemical analyses, transverse tests, impact tests, and hardness determinations on cast iron.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and the Battelle Memorial Institute), 29 West 39th Street, New York, N. Y.
Creep of metals at elevated temperatures.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and various industrial laboratories), 29 West 39th Street, New York, N. Y.
Development of a test code for high-temperature tensile and creep tests.
High-temperature effects on mechanical properties and structural stability of cast, wrought, and stainless steel.

American Society of Mechanical Engineers (in cooperation with the American Society for Testing Materials and 13 manufacturers), 29 West 39th Street, New York, N. Y.
Comparative high-temperature short-time tension tests.

American Society of Mechanical Engineers (in cooperation with the Carnegie Institute of Technology and various industrial laboratories), 29 West 39th Street, New York, N. Y.
Forces in the cold rolling of nonferrous metals.
Roll neck forces in hot rolling alloy steels.

American Society of Mechanical Engineers (in cooperation with the Carnegie Institute of Technology), 29 West 39th Street, New York, N. Y.
Forces and stresses in roll-neck bearings.

American Society of Mechanical Engineers (in cooperation with the Massachusetts Institute of Technology, the Engineering Foundation, and industrial laboratories), 29 West 39th Street, New York, N. Y.
Strength of gear teeth.

American Society of Mechanical Engineers (in cooperation with Union College), 29 West 39th Street, New York, N. Y.
Elasticity of spring materials.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Elastic properties of electrical-resistance alloys.

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American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and the Battelle Memorial Institute), 1315 Spruce Street, Philadelphia, Pa.
Creep of metals at elevated temperatures.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and 13 manufacturers), 1315 Spruce Street, Philadelphia, Pa.
Comparative high-temperature short-time tension tests.

American Society for Testing Materials (in cooperation with the American Society of Mechanical Engineers and various industrial laboratories), 29 West 39th Street, New York, N. Y.
High-temperature effects on mechanical properties and structural stability of cast, wrought, and stainless steel.
Development of a test code for high-temperature tensile and creep tests.

American Society for Testing Materials (in cooperation with Deere & Co.), 1315 Spruce Street, Philadelphia, Pa.
Falling weight drop tests on cast iron.

American Society for Testing Materials (in cooperation with Rensselaer Polytechnic Institute, Bethlehem Steel Company, Illinois Steel Company, and the University of Wisconsin) 1315 Spruce Street, Philadelphia, Pa.
Yield point of structural steel.

American Society for Testing Materials (in cooperation with 16 industrial and governmental laboratories), 1315 Spruce Street, Philadelphia, Pa.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

American Society for Testing Materials (in cooperation with 13 industrial, university and government laboratories), 1315 Spruce Street, Philadelphia, Pa.
Impact tests, hardness determinations, compression tests, and other determinations on cast iron.

Babcock & Wilcox Co., 85 Liberty Street, New York, N. Y.
Creep of steel.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Low-temperature properties of aircraft materials, including fatigue, impact, tensile and other properties.

Battelle Memorial Institute (in cooperation with the American Society for Testing Materials and the American Society of Mechanical Engineers), 505 King Avenue, Columbus, Ohio.
Creep of metals at elevated temperatures.

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Bell Telephone Laboratories, Incorporated (in cooperation with the American Society for Testing Materials), New York, N. Y.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

Bethlehem Steel Co. (in cooperation with the American Society for Testing Materials, Rensselaer Polytechnic Institute, Illinois Steel Co., and the University of Wisconsin), Bethlehem, Pa.
Yield point of structural steel.

Bunting Brass and Bronze Co. (in cooperation with the United States Bureau of Standards), Toledo, Ohio.
Resistence to impact of bronze alloys.
Resistence to repeated pounding of bronze alloys.

California Institute of Technology, Pasadena, Calif.
Investigation of strength and hardness relationships of certain solid solution proportions of the noble metals.

California Institute of Technology, Department of Mechanics, Pasadena, Calif.
Investigation to determine whether Shore scleroscope would show different rebounds for specimens under stress and specimens not under stress.

Carnegie Institute of Technology, Bureau of Metallurgical Research, Schenley Park, Pittsburgh, Pa.
The effect of cold-working and reheating on the hardness of steels.
Mechanical properties of steels.
The effect of nonmetallic impurities on deformation in metals.

Carnegie Institute of Technology (in cooperation with the American Society of Mechanical Engineers), Schenley Park, Pittsburgh, Pa.
Forces and stresses in roll-neck bearings.

Carnegie Institute of Technology (in cooperation with the American Society of Mechanical Engineers and various industrial laboratories), Pittsburgh, Pa.
Forces in the cold rolling of nonferrous metals.
Roll neck forces in hot rolling alloy steels.

Catholic University of America, Washington, D. C.
Study of locked-up stresses caused by welding heat.

Crane Company Laboratory, 836 South Michigan Avenue, Chicago, Ill.
Long-time tension tests of steels at elevated temperatures.

Deere & Co. (in cooperation with the American Society for Testing Materials), Moline, Ill.
Falling weight drop tests on cast iron.

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The Engineering Foundation (in cooperation with the American Society of Mechanical Engineers), 29 West 39th Street, New York, N. Y.
Strength of gear teeth.

Firth-Sterling Steel Co., McKeesport, Pa.
Cutting properties of tungsten and tantalum hard-metal compositions.

General Electric Co., Research Laboratory, Schenectady, N. Y.
The relation, if any, of impact value to notched fatigue.
The effect of heat treatment on impact value.
Characteristics of various steels under torsion and at elevated temperatures.
Causes of brittleness in medium silicon steel sheet (Si 2.5-4 per cent).

General Electric Co. (in cooperation with the American Society for Testing Materials), West Lynn, Mass.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

General Motors Co. (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Unnotched Charpy impact tests on cast iron.

General Motors Research Corporation (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

The Geometric Tool Co., New Haven, Conn.
Alloy steels, particularly high-speed steels, and their machining qualities.
The machining qualities of alloys of copper and aluminum.

The Hoover Co. (in cooperation with the American Society for Testing Materials), North Canton, Ohio.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

University of Illinois (in cooperation with the American Society for Testing Materials), Urbana, Ill.
Izod impact tests and compression tests on cast iron.

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University of Illinois, Engineering Experiment Station (in cooperation with the Utilities Research Commision, Incorporated), Urbana, Ill.
Stretching (creep) of lead cable sheath under prolonged stress.

Illinois Steel Co. (in cooperation with the American Society for Testing Materials, Rensselaer Polytechnic Institute, Bethlehem Steel Co., and the University of Wisconsin), 208 South LaSalle Street, Chicago, Ill.
Yield point of structural steel.

International Lead Refining Co., 151st and McCook Avenue, East Chicago, Ind.
Mechanical properties of lead alloys.

International Nickel Co. (in cooperation with the American Society for Testing Materials), 67 Wall Street, New York, N. Y.
Notched Charpy tests on cast iron.

Lafayette College, Easton, Pa.
An investigation of a high tensile strength cast iron.

Lunkenheimer Co. (in cooperation with the American Society for Testing Materials), Beekman Street and Waverly Avenue, Cincinnati, Ohio.
Tensile tests, shear tests, and falling weight drop tests on cast iron.

Lynchburg Foundry Co. (in cooperation with the American Society for Testing Materials), Lynchburg, Va.
Tension tests of cast iron.

Maine State Highway Department, Orono, Me.
Determination of a unit working stress for hooked reinforcing steel for concrete.

University of Maine, Orono, Me.
Effect of hot twisting on the strength and structure of iron and steel.
Effect of repeatedly stressing metals beyond yield point in torsion and tension.

Massachusetts Institute of Technology (in cooperation with the American Society of Mechanical Engineers and industrial laboratories), Cambridge, Mass.
Strength of gear teeth.

University of Michigan, Ann Arbor, Mich.
Strength of ductile materials subjected to shear at elevated temperatures.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Effect of temperature on tensile strength of lead.
The machinability of malleable cast iron.

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University of Michigan (in cooperation with the Allis-Chalmers Manufacturing Co.), Ann Arbor, Mich.
Intermittent creep tests of 500 pounds per square inch at 850°F. for 2,000 hours on forged and cast steels.
Creep-test analysis at elevated temperature on materials suitable for large stationary and rotating structures.
Separate single-load creep tests for each load arrived at in increments of loading in the original creep tests.

University of Michigan (in cooperation with the American Society for Testing Materials), Ann Arbor, Mich.
Notched Izod impact tests on cast iron.

University of Minnesota, College of Engineering and Architecture, Minneapolis, Minn.
Plastic and elastic deformation of ferrous metals.

Montana State School of Mines, Butte, Mont.
Relation between Brinell, Rockwell, scleroscope, and scratch hardnesses of certain minerals.

Montana State School of Mines, State Bureau Mines and Geology, Butte, Mont.
Hard and soft states of metals.

The National Lead Co. (in cooperation with the American Society for Testing Materials), Brooklyn, N. Y.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

The New Jersey Zinc Co. (in cooperation with the American Society for Testing Materials), Palmerton, Pa.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

Northwestern University, Evanston, Ill.
Effect of shrinkage as a controlling factor in increases of compressive reinforcing steel deformation with continued load.

Packard Motor Car Co. (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

University of Pittsburgh, Pittsburgh, Pa.
Stress distribution in fillet welds.

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Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y.
Effect of low temperature annealing time on torsional properties of music wire.
Effect of original grain size of low-carbon steel on tensile properties at elevated temperatures.
The core effect on the experimentally determined hardness values of nitrided-steel cases.

Polytechnic Institute of Brooklyn, Department of Civil Engineering, 99 Livingston Street, Brooklyn, N. Y.
Investigation of the torsional strength of metals at high temperature.

Rensselaer Polytechnic Institute, Troy, N. Y.
Investigation of the torsional strength of the metals at high temperature.
Internal stress produced by fillet welds made by metallic arc.

Rensselaer Polytechnic Institute (in cooperation with the American Society for Testing Materials, the Bethlehem Steel Co., the Illinois Steel Co., and the University of Wisconsin), Troy, N. Y.
Yield point of structural steel.

Spicer Manufacturing Corporation, 4100 Bennett Road, Toledo, Ohio.
Strengths and critical speeds of propeller shafts for motor cars and similar applications.

Stewart Die Casting Corporation (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

Union College (in cooperation with the American Society of Mechanical Engineers), Schenectady, N. Y.
Elasticity of spring materials.

United States Army Air Corps (in cooperation with the American Society for Testing Materials), Dayton, Ohio.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

United States Bureau of Standards, Washington, D. C.
Effect of excessive cold working on the hardness of metals.
Compression properties and impact resistance of metals at high temperatures.
Notch propagation in coated metals.
Physical and mechanical properties of sprayed metal.
Load-carrying capacity of journal bearings.
Principles of the machinability of metals.
Strength of aircraft tubing.

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United States Bureau of Standards--Continued.

Torsional strength and other properties of thin-walled tubing for use in aircraft.

Investigation of the effect of the restraining moments of ends of columns upon compressive strength (end fixation of struts).

Inelastic behavior of duralumin and alloy steel in tension and compression.

Properties of rail steel, with special reference to transverse fissures.

Flow characteristics of iron-nickel and chromium alloys and steels at elevated temperatures.

Creep in alloy steels under load at high temperature.

Investigation of the strength and other properties of wires making up the cable strands for suspension bridges.

The compressive strength and deformation of structural steel and cast-iron shapes at high temperatures.

Effects of variations in composition on cutting tests of high-speed tool steels.

The strength of welded rail joints.

Resistance of rectangular plates of duralumin of different thickness to bulging under normal pressure.

Strength and other properties of duralumin channels and sections used in aircraft construction.

The strength of welded joints in steel tubes for use in aircraft.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.

Charpy impact tests and direct tensile impact tests on cast iron.

Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

United States Bureau of Standards (in cooperation with the Bunting Brass and Bronze Co.), Washington, D. C.

Resistance to impact of bronze alloys.

Resistance to repeated pounding of bronze alloys.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.

Investigation of effect of stress, time, and number of cycles in causing penetration of metal under corrosion.

Investigation of the effects of various degrees of cold working on stainless steels, especially the torsional-fatigue properties when in the form of elliptical wire.

Long-time creep test of nonferrous metals.

United States Navy Yard, Material Branch (in cooperation with the American Society for Testing Materials), Washington, D. C.

Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

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Utilities Research Commission, Incorporated (in cooperation with the University of Illinois), Room 522, 72 West Adams Street, Chicago, Ill.
Stretching (creep) of lead cable sheath under prolonged stress.

Walworth Alabama Co., Attalla, Ala.
The effect of phosphorus on the strength of high-test gray iron.
Development of high-test gray iron having maximum strength.

Western Electric Co. (Inc.) (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

Westinghouse Electric & Manufacturing Co. (in cooperation with the American Society for Testing Materials), East Pittsburgh, Pa.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

White Motor Co. (in cooperation with the American Society for Testing Materials), Cleveland, Ohio.
Tension and impact tests on die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys after 1, 3, and 5 years outdoor exposure at 6 places and indoor exposure at 4.

University of Wisconsin (in cooperation with the American Society for Testing Materials), Madison,,Wisconsin.
Fatigue tests and Russell impact tests on cast iron.

University of Wisconsin, Materials Testing Laboratory (in cooperation with the American Society for Testing Materials, Rensselaer Polytechnic Institute, Bethlehem Steel Company, and Illinois Steel Company), Madison, Wis.
Yield point of structural steel.

Yale University, Department of Mechanical Engineering, New Haven, Conn.
Analysis of stresses in steel-pipe flanges and fittings, preparatory to the adoption of standard proportions.

Yale University, Sloane Physics Laboratory, New Haven, Conn.
Elastic constants of single crystals of nickel and iron.

VIII. Properties: Miscellaneous

AC Spark Plug Co., Flint, Mich.
Physical properties of nonferrous alloys.

University of Akron, Department of Chemistry, Akron, Ohio.
Properties of pure Fe-Cr alloys.
Diffusion of chromium and iron.

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Aluminum Co. of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Metallurgy of aluminum and its alloys.
Engineering properties and applications of aluminum and its alloys.

Aluminum Co. of America (in cooperation with the American Society for Testing Materials), New Kensington, Pa.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Aluminum Industries (Inc.), 2416-38 Beekman Street, Cincinnati, Ohio.
Physical properties of aluminum alloys.

American Brass Co. (in cooperation with the American Society for Testing Materials), Waterbury, Conn.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

American Can Co., Research Department, 11th Avenue and St. Charles Road, Maywood, Ill.
The physical properties and chemical composition of tin plate and black iron sheets to determine the improvements necessary for certain usages.
Compositions and properties of solders.

American Chain Co. (Inc.), Bridgeport, Conn.
Influence of welding conditions and subsequent heat-treatment on the structure of welds.

American Dental Association (in cooperation with the United States Bureau of Standards), 58 East Washington Street, Chicago, Ill.
Study of dental materials for the establishment of specifications and standards for these materials.

American Foundrymen's Association (in cooperation with the United States Bureau of Standards), 222 West Adams Street, Chicago, Ill.
Determination of the amount of liquid shrinkage of certain specified mixtures.

American Foundrymen's Association (in cooperation with the Nonferrous Ingot Metal Institute, the United States Bureau of Standards, and the American Society for Testing Materials), 222 West Adams Street, Chicago, Ill.
Physical properties of copper alloys in ingot form.

American Hammered Piston Ring Co., Box 758, Baltimore, Md.
Alloying properties.

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American Society of Mechanical Engineers (in cooperation with The Engineering Foundation and the University of Michigan), 29 West 39th Street, New York, N. Y.
Relations between the physical and chemical characteristics of cutting fluids and their performance.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Correlation of properties of iron castings and test bars.

American Society for Testing Materials (in cooperation with the American Foundrymen's Association, Nonferrous Ingot Metal Institute, and the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Physical properties of copper alloys in ingot form.

American Society for Testing Materials (in cooperation with Columbia University), 1315 Spruce Street, Philadelphia, Pa.
Effect of lead on standard Navy babbitt.

American Society for Testing Materials (in cooperation with the United States Bureau of Standards), 1315 Spruce Street, Philadelphia, Pa.
Properties of babbitt metal.

American Society for Testing Materials (in cooperation with 16 industrial and governmental laboratories), 1315 Spruce Street, Philadelphia, Pa.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Association of Manufacturers of Chilled Car Wheels, 1847 McCormick Building, Chicago, Ill.
Effect of additions of nickel, silicon, molybdenum, chrome, and vanadium to chilled tread wheel mixtures.

Bagdad Copper Corporation, Hillside, Ariz.
Physical characteristics of electrolytic copper as prepared by the Weatherbee process.

Barber-Colman Co., Rockford, Ill.
Relationship between heat treatment and physical properties of high-speed steel, also various other steels.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Comprehensive study of the properties of cast irons with a view to developing iron of superior quality, especially with reference to properties at elevated temperatures.

Battelle Memorial Institute (in cooperation with the Engineering Foundation and 10 technical societies), 505 King Avenue, Columbus, Ohio.
Collection and codification of known information on alloys of iron.

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Bell Telephone Laboratories (Inc.) (in cooperation with the American Society for Testing Materials), New York, N. Y.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Bunting Brass & Bronze Co. (in cooperation with the United States Bureau of Standards), Toledo, Ohio.
Effect of impurities on bronze alloys.

California Institute of Technology, Pasadena, Calif.
Determination of the difference in the constitution of sorbite and troostite.

Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.
The influence of sulphur dioxide on the solubility of tin oxide.

Carnegie Institute of Technology, Bureau of Metallurgical Research, Schenley Park, Pittsburgh, Pa.
Studies of the constitution of high-manganese steels, of chrome steels, and of high-nickel steels.
The effect of composition on the critical points of stainless steels.
The study of normal and abnormal steels.
The effect of nonmetallic impurities on deformation in metal.
The determination of the crystal structure of several important intermetallic compounds, including magnesium plumbide, magnesium dizincide Cu_2Mg, $CuAl_2$, and iron phosphide.
The analysis of the arc spectra in iron, nickel and cobalt.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
A study of high-temperature solders for special applications in the zone from 400 to 1000° F. and brazes for applications in the zone from 1300 to 1800° F., including physical properties, application to various metals, etc.

University of Chicago, Kent Chemical Laboratory, Chicago, Ill.
The physical and chemical properties of the compounds of gallium and germanium.
The chemistry of gallium and germanium.

Columbia University (in cooperation with the American Society for Testing Materials), New York, N. Y.
Effect of lead on standard Navy babbitt.

Detroit Edison Co. (in cooperation with University of Michigan), 2000 Second Avenue, Detroit, Mich.
Long-time tests of pipe-line flange bolts in service.

Detroit Lubricator Co., 5842 Trumbull Avenue, Detroit, Mich.
The effect of impurities in foundry bronzes.

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Henry Disston & Sons (Inc.), Tacony, Philadelphia, Pa.
The influence of character and source of raw materials on the quality of tool steel made in electric furnace.

The Duriron Co. (Inc.), Dayton, Ohio.
Effect of nonmetallic inclusions on the properties of high-silicon iron.

Engineering Foundation, 29 West 39th Street, New York, N. Y.
Buckling strength of outstanding flanges and plates.
Alloys of iron research.

Engineering Foundation (in cooperation with the American Society of Mechanical Engineers), 29 West 39th Street, New York, N. Y.
Relations between the physical and chemical characteristics of cutting fluids and their performance.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Determination of causes for "fish-scale" in high-speed steel.
Construction of Co-C diagram.
Effect of small percentages of bismuth on the chemical and physical properties of lead, and lead alloys.
Characteristics of silicon-steel sheets.
The nature of nitrogen needles.

General Electric Co. (in cooperation with the American Society for Testing Materials), West Lynn, Mass.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

General Motors Research Corporation (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Harvard University, Cambridge, Mass.
Structure studies on gold telluride.
Influence of elements on the eutectoid point of steel.
Influence of calcium and oxygen on iron and steel.
Aging of iron and steel.

Harvard University, Harvard Engineering School, Rotch Building, Cambridge, Mass.
Microscopical characters as guides to methods of treatment of ore.
Manner of occurrence of mineral constituents.

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The Hoover Co. (in cooperation with the American Society for Testing Materials), North Canton, Ohio.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Hupp Motor Car Corporation, Detroit, Mich.
Physical properties of solders from 0 to 350° F.

International Lead Refining Co., 151st and McCook Avenue, East Chicago, Ind.
Investigation of properties of bismuth alloys.
Properties of common lead.

International Motor Co., New Brunswick, N. J.
The effect of certain virgin aluminums on localized shrinks producing porosity.

The International Nickel Co. (Inc.), Development and Research Department, 67 Wall Street, New York, N. Y.
Effect of nickel on bronzes.

State University of Iowa, Department of Chemistry, Iowa City, Iowa.
Properties of alloys of barium and of strontium.
Effects of silicon on the properties of brass.

University of Kentucky, Department of Mines and Metallurgy, Lexington, Ky.
A study of the physical effects of the addition to aluminum of relatively small amounts of various alloying substances, including melting procedure, heat treatment, and physical and microscopic testing in both the cast and worked conditions.

Lehigh University, Department of Metallurgical Engineering, Bethlehem, Pa.
The iron-silicon equilibrium diagram.
The properties of pure, gas-free iron in arc welding.

University of Maine, Orono, Me.
The properties of molybdenum steel.

Marquette University, College of Engineering, 1210 West Michigan Street, Milwaukee, Wis.
Correlation of structure and physical properties with respect to the principal bearing metals and alloys.

Metals Coating Co. of America, 497 North 3rd Street, Philadelphia, Pa.
Physical and chemical properties of sprayed molten metal coatings.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Rates of diffusion of carbon, phosphorus and sulphur into iron and the pressure, temperature, concentration relations.

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Michigan College of Mining and Technology--Continued.
Study of copper-silver alloy system.
X-ray study of cast copper.
The system copper-cuprous oxide.

University of Michigan, Ann Arbor, Mich.
The physical properties and behavior of materials for heavy plates for boiler drums.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Properties and behavior of materials now used for turbine blades.
Long-time tests of pipe-line flange bolts.
Study of the strength and related properties of ferrous and nonferrous metals at elevated temperatures.

University of Michigan (in cooperation with the American Society of Mechanical Engineers), Ann Arbor, Mich.
Relations between the physical and chemical characteristics of cutting fluids and their performance.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Long-time tests of pipe-line flange bolts in service.

University of Michigan, Department of Engineering Research (in cooperation with the Utilities Research Commission (Inc.), Ann Arbor, Mich.
Permeability of alloy retorts to various gases.

The Midvale Co., Nicetown, Philadelphia, Pa.
Effect of factors in heat-treatment on physical properties of steel.
Effect of additions of alloys on properties of steel.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
Use of X-ray methods in determination of the crystal structure of nickel silicate, nickel titanate, zinc titanate, zinc stannate.
Application of X-rays in the study of various metallurgical problems.

Montana State School of Mines, Butte, Mont.
The constitution and structure of the ternary mattes Cu_2S-PbS-Sb_2S_3, with especial reference to specific gravity.

The National Lead Co. (in cooperation with the American Society for Testing Materials), Brooklyn, N. Y.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

National Slag Association, 937 Leader Building, Cleveland, Ohio.
Physical and chemical properties of slags.

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The New Jersey Zinc Co. (in cooperation with the American Society for Testing Materials), Palmerton, Pa.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Nonferrous Ingot Metal Institute (in cooperation with the United States Bureau of Standards, the American Foundrymen's Association and the American Society for Testing Materials), 308 West Washington Street, Chicago, Ill.
Physical properties of copper alloys in ingot form.

The Ohio State University, Engineering Experiment Station, Columbus, Ohio.
Properties of alloys.
X-ray analysis of alloy steels.

Packard Motor Car Co. (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

The Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, Ill.
Effects of gases on metals.

Pfanstiehl Chemical Co., Manufacturers Terminal, Waukegan, Ill.
General study of the alloys of the rarer metals and elements with ferrous-metal bases.
The properties and uses of the rarer metals and their alloys.

Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y.
Physical properties of certain sheet brass alloys, including the effect of rolling and annealing on these properties.

Rail Steel Bar Association, 228 North LaSalle Street, Chicago, Ill.
Effect of varying percentages of carbon and manganese on physical properties of finished products.
Effect of cooling rate and design of hot beds on physical properties of finished products.

Rensselaer Polytechnic Institute, Troy, N. Y.
Effects of annealing and heat treatment on physical properties of nickel and nickel alloys (precipitation hardening).
Physical properties of alloys of copper with iron and silicon.
Gases in metals particularly applied to pinholes in aluminum castings.
Properties of metallic zirconium.
Properties of modified silumin alloys.
Physical properties of nickel chromium alloys in the range of stainless steels.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Study of the relationship between cold working, annealing, and crystal size in brasses.

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Rhode Island Malleable Iron Works, Hills Grove, R. I.
Improvement of properties of malleable iron.

Stewart Die Casting Corporation (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Properties of nickel-manganese (austenitic) steels.

Union Carbide and Carbon Research Laboratories, Incorporated, 30 East 42nd Street, New York, N. Y.
Characteristics of alloy steels.

United States Army Air Corps (in cooperation with the American Society for Testing Materials), Dayton, Ohio.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

United States Bureau of Mines, Intermountain Experiment Station (in cooperation with the University of Utah), Salt Lake City, Utah.
Microscopic investigation of the mineral associations in the complex ores.

United States Bureau of Standards, Washington, D. C.
Properties of zinc and cadmium.
Chemical and physical properties of the platinum-group metals and their alloys.
Fluidity of cast iron
Critical review of literature of pure iron.
Properties of pure iron.
Physical constants of metals of unusual degrees of purity.
Preparation of an encyclopedia of specifications for metals and metal products.
Heats of formation of certain metallic oxides.
Solubility of gases in metals.

United States Bureau of Standards (in cooperation with the American Dental Association), Washington, D. C.
Study of dental materials for the establishment of specifications and standards for these materials.

United States Bureau of Standards (in cooperation with the American Foundrymen's Association), Washington, D. C.
Determination of the amount of liquid shrinkage of certain specified mixtures.

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United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.
Properties of babbitt metal.

United States Bureau of Standards (in cooperation with the Bunting Brass and Bronze Co.), Washington, D. C.
Effect of impurities on bronze alloys.

United States Bureau of Standards (in cooperation with the Nonferrous Ingot Metal Institute, the American Foundrymen's Association and the American Society for Testing Materials), Washington, D. C.
Physical properties of copper alloys in ingot form.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
The effect of surface defects.

United States Navy Yard, Material Branch (in cooperation with the American Society for Testing Materials), Washington, D. C.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
The chromium-nickel-iron series of alloys.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research (in cooperation with the United States Bureau of Mines), Salt Lake City, Utah.
Microscopic investigation of the mineral associations in the complex ores.

Utilities Research Commission (Inc.) (in cooperation with the University of Michigan), 72 West Adams Street, Chicago, Ill.
Permeability to various gases of alloy retorts.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Blacksburg, Va.
Properties of welded joints.

Wabash College, Department of Chemistry, Crawfordsville, Ind.
The composition of meteoritic irons from the region surrounding the Barringer meteorite.

Western Electric Co. (Inc.) (in cooperation with the American Society for Testing Materials), Chicago, Ill.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

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Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Fatigue tests of fillet welds to determine effect of machining spacing and size of weld.
Fatigue and impact tests of welds.

Westinghouse Electric & Manufacturing Co. (in cooperation with the American Society for Testing Materials), East Pittsburgh, Pa.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

White Motor Co. (in cooperation with the American Society for Testing Materials), Cleveland, Ohio.
Physical properties of die cast test specimens from 12 aluminum-base alloys and 9 zinc-base alloys.

Yale University, Department of Mining and Metallurgy, 14 Mansfield Street, New Haven, Conn.
Constitution of silver-silicon alloys.
Directional properties in rolled and annealed copper sheet.
Equilibrium between iron and certain metallic oxides.

IX. Extraction and Refining

The Ajax Metal Co., 46 Richmond Street, Philadelphia, Pa.
Reclamation of scrap metals and recovery of by-products.

Aluminum Co. of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Preparation of pure alumina from bauxite and other aluminous materials.
Reduction of alumina to metallic aluminum.

American Can Co., Research Department, 11th Avenue and St. Charles Road, Maywood, Ill.
Methods for recovery of solder from solder by-products.

American Cyanamid Co., 535 Fifth Avenue, New York, N. Y.
Application of cyanide to gold and silver extraction.
Electrothermal recovery of zinc.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Recovery of tin from tin-bearing residues.

American Smelting & Refining Co., 120 Broadway, New York, N. Y.
Electrolytic refining of brass.
Processing electrolytic-lead slimes.
Production of liquid sulphur dioxide.
Treatment of fume bags to prolong life.

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American Smelting & Refining Co.--Continued.
Refining of white arsenic.
Leaching copper-plant Cottrell dusts.
Treatment of lead-bullion drosses.
Zinc-retort practice.

University of Arizona (in cooperation with the United States Bureau of Mines), Tucson, Ariz.
Oxidation of copper concentrates.

Bagdad Copper Corporation, Hillside, Ariz.
Roasting of copper concentrates.
Cyanidation of concentrates.

Baker & Co. (Inc.), 54 Austin Street, Newark, N. J.
Best methods of separation and purification of the platinum metals.

J. T. Baker Chemical Co., North Broad Street, Phillipsburg, N. J.
Preparation of molybdenum and its compounds.
Preparation of tungsten and its compounds.

Bethlehem Foundry & Machine Co., Wedge Furnace Department, Bethlehem, Pa.
Drying and roasting of various ores and concentrates preparatory to blast-furnace or reverberatory-furnace treatment, leaching, electrolytic extraction, or other treatment.

Birmingham-Southern College, Department of Chemistry, Birmingham, Ala.
Relation of composition and fineness to the properties of blast furnace slag cements.

California Institute of Technology, Pasadena, Calif.
Purification of copper-leaching solutions.

University of California, Department of Mining and Metallurgy, Berkeley, Calif
New possibilities in the desilverisation and refining of lead bullion.

Callite Products Co., 540 39th Street, Union City, N. J.
Extraction of tungsten from its ores.
Extraction of molybdenum from its ore by the sublimation processes.

Carus Chemical Co., LaSalle, Ill.
Efficient production of manganese salts from manganese ores.

Cerro de Pasco Copper Corporation, 44 Wall Street, New York, N. Y.
Extraction and purification of bismuth.
Roasting and leaching of low-grade silver ores.

University of Chicago, Kent Chemical Laboratory, Chicago, Ill.
Extraction of gallium and germanium from germanite ore.

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Columbia University, Department of Chemical Engineering, New York, N. Y.
Extraction of beryllium, titanium, tungsten, columbium, tantalum, and vanadium from their ores.

University of Colorado, Boulder, Colo.
Methods for the extraction of tungstic acid from tungsten-bearing tin residues, such as those obtained in Cornwall.

The DeLaval Separator Co., Poughkeepsie, N. Y.
Recovery of tin in tinning processes.
Reclamation of bearing metals and type metals.

The Dorr Co., 247 Park Avenue, New York, N. Y.
Leaching of carnotite ores.
Leaching of chrysocolla.
Recovery of zinc from zinc skimmings.

Engineering Foundation (in cooperation with the University of Wisconsin), 29 West 39th Street, New York, N. Y.
Physical metallurgy of blast-furnace slags.

Erie City Iron Works, Erie, Pa.
Direct electric reduction of iron oxides.

Evans Wallower Zinc Co., Monsanto Post Office, East St. Louis, Ill.
Production of electrolytic zinc.

University of Florida, College of Pharmacy, Department of Chemistry, Gainesville, Fla.
Extraction of titanium and zirconium from their minerals.

Gas Industries Co., 2813 Penn Avenue, Pittsburgh, Pa.
Application of oxygen and oxygen enriched air to the production of metals in blast furnaces.

General Electric Co., 1 River Road, Schenectady, N. Y.
Commercial production of carbonless iron (C under 0.01).

General Electric Co., Research Laboratory, Schenectady, N. Y.
Refining of lead scrap.
Purification and reduction of tungsten and molybdenum oxides.
Production of caesium compounds.
Degassing metals, especially copper.

General Electric Vapor Lamp Co., 410 8th Street, Hoboken, N. J.
Purification of mercury to extreme degrees.

The Glidden Co., Cleveland, Ohio.
Zinc leaching.
Lead smelting.

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Harshaw Chemical Co., 1945 East 97th Street, Cleveland, Ohio.
The extraction of chromite.

Inspiration Consolidated Copper Co., Inspiration, Ariz.
Making of ferric sulphate for leaching copper by electrolysis.

International Electric Smelter & Machine Co., 505-41 Park Row, New York, N.Y.
Electrolytic smelting and refining.
Electrochemical reduction of ores.

International Lead Refining Co., 151st and McCook Avenue, East Chicago, Ind.
Removal of bismuth from lead.
Production of refined bismuth.
Removal of zinc from desilverized lead and recovery of zinc in marketable form in the Parkes process of lead refining.
Removal of antimony from base bullion.
Refining antimony-lead alloys.
Production of metallic antimony.

International Smelting Co., Inspiration, Ariz.
Distribution and effect of magnetite in matte.
Chemical problems of copper metallurgy.
Leaching of copper ores and precipitation of copper.

State University of Iowa, Department of Chemistry, Iowa City, Iowa.
Recovery of beryllium from beryl.

University of Kansas, Engineering Experiment Station, Lawrence, Kans.
Treatment of Mississippi valley zinc ores by the electrolytic process.

University of Maine, Orono, Me.
Extraction of rare metals from their ores.

The Martin Dennis Co., 859 Summer Avenue, Newark, N. J.
Extraction of chromium as soluble salts from chrome iron ore or chromite.

Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
Form in which copper exists in smelter slags.
Leaching copper from reverberatory slags.
Softening lead by use of an easily fusible flux.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Chrome ore fellowship.
Aluminum fellowship.
Slag fellowship.

Metal and Thermit Corporation, 120 Broadway, New York, N. Y.
Utilization of rutile and ilmenite.

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Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Copper refining with special relation to arsenic.
Secondary metal reclamation.
Extraction of copper from slag.
Extraction of the rare metals from their deposits and the refining of the crude metal obtained.
Direct reduction and beneficiation of iron ores.
Leaching of copper.

Mississippi Valley Research Laboratories, Incorporated, 660 South 18th Street, St. Louis, Mo.
Extraction of Ti from minerals containing less than 10 per cent TiO_2.

Missouri School of Mines and Metallurgy, Department of Metallurgy and Ore Dressing, Rolla, Mo.
Sintering of zinc ores.
Preparation of durable anodes for extraction of zinc from sulphuric acid solutions.

Monmouth College, Department of Physics and Geology, Monmouth, Ill.
Extraction of metallurgical alumina from clays.

Montana State School of Mines, Butte, Mont.
Effect of various methods of pouring upon the formation of pipe in ingots.
Effect of impurities upon the current efficiency in the production of electrolytic zinc.

Motor City Testing Laboratory (Inc.), 4410 Elmhurst Street, Detroit, Mich.
The extraction of rare metals from their ores.
The extraction of nickel, chromium, and tungsten.
The extraction of ferrous alloys from their ores.
The production of alloys from their ores in a 1-step process.
The production of steel from ores in one step.
The production of rare metal and iron alloys.

W. Faitoute Munn, 318 White Street, Orange, N. J.
Extraction of rare earths as salts and production of rare metals by electrodeposition.

National Lead Co., Research Laboratories, 105 York Street, Brooklyn, N. Y.
Various steps in process for secondary-metal refining.

National Slag Association, 937 Leader Building, Cleveland, Ohio.
Physical and chemical properties of slags.
Properties of concretes in which slag has been used as the aggregate.
Development of a test for durability of slag products.
Development of new uses for slag.
Development and standardization of test methods for slag and its products.

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The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Continuous smelting of zinc ores in vertical retorts.
Production of spiegel iron.

University of North Carolina, Chapel Hill, N. C.
Hydrometallurgical recovery of copper from oxidized ores and precipitati
of copper from solutions.
The system copper-iron-sulphuric acid-water.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Dewatering of anode muds from electrolytic processes.
Dewatering of flue-dust at smelters after its collection by any method yielding wet mixtures.

Oregon State Agricultural College, School of Mines, Corvallis, Oreg.
Sublimation of mercury sulphide concentrates.

Pennsylvania Agricultural Experiment Station, State College, Pa.
The value of blast-furnace slag as a source of agricultural lime.

Lucius Pitkin (Inc.), 47 Fulton Street, New York, N. Y.
Extraction of beryllium.

Rare Metals Corporation, Naturita, Colo.
Recovery of radium from vanadium extraction processes.
Extraction of vanadium oxide from uranium-vanadium ores of southwestern Colorado.
Extraction of uranium compounds from vanadium extraction slimes from carnotite ore.

Rensselaer Polytechnic Institute, Troy, New York.
Physical-chemical studies of methods for separation of zinc and cadmium.
Recovery of zinc from pickling liquors.
Improvements in metallurgical practice in the separation of iron and copper in nickel ores.
The method of separating zinc and cadmium in the baghouse fume in lead smelters.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
The extraction of beryllium from beryl.

Allen E. Rogers Consulting Laboratory, 245 Franklin Avenue, Brooklyn, N. Y.
The recovery and purification of the element beryllium.

The S. W. Shattuck Chemical Co., 1805 South Bannock Street, Denver, Colo.
Extraction of tungsten, molybdenum, uranium, and vanadium from their ores or concentrates to give chemically pure and technical salts and acids.

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South Dakota State School of Mines, Rapid City, S. Dak.
Recovery of gold from ores where it is closely associated with arsenopyrite.
The extraction of aluminum from clays, etc.

South Dakota State School of Mines, South Dakota State Mining Experiment Station, Rapid City, S. Dak.
Recovery of gold from Black Hills blue ores in which the gold is associated with a pyrite containing small amount of arsenic.

Stackpole Carbon Co., Tannery Street, St. Marys, Pa.
The reduction of metallic oxides by natural gas.

Superior Zinc Corporation, Bristol, Pa.
Treatment of zinc residues from chemical plants to produce metal or a marketable grade of zinc oxide.

Syracuse University, Department of Chemistry, Syracuse, N. Y.
Preparation of alkaline-earth metals.

Union Carbide and Carbon Research Laboratories, Incorporated, 30 East 42nd Street, New York, N. Y.
Smelting of chromium, tungsten, molybdenum, vanadium, manganese, silicon, zirconium and other semirare metals.

United States Bureau of Mines, Intermountain Experiment Station (in cooperation with the University of Utah), Salt Lake City, Utah.
Separation of impurities from zinc concentrates by volatilization.
A study of the roasting of zinc ores as a preparation for their hydrometallurgical treatment to secure maximum solubility of zinc.
A study of the forms in which lead is now being lost in smelter slags.

United States Bureau of Mines, North Central Experiment Station (in cooperation with the University of Minnesota), Minneapolis, Minn.
Kinetics of iron-ore reduction.
Mechanism of sulphur elimination in the blast furnace.
Transfer of heat from a moving gas stream to a column of irregular solids.
Nitrogen content of sponge iron and metal obtained by melting sponge iron.

United States Bureau of Mines, Pacific Experiment Station (in cooperation with the University of California), Berkeley, Calif.
Reduction of oxides of iron by methane.

United States Bureau of Mines, Rare and Precious Metals Experiment Station (in cooperation with the University of Nevada), Reno, Nev.
Continuous zinc smelting with natural gas.
Hydrometallurgy of manganese.

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United States Bureau of Mines, Southwest Experiment Station (in cooperation with the University of Arizona), Tucson, Ariz.
Oxidation of copper concentrates.

United States Bureau of Standards, Washington, D. C.
Purification of the metals of the platinum group.

United States Geological Survey, Washington, D. C.
Leaching of lead and zinc sulphides from chat piles in northeastern Oklahoma.

United States Metals Refining Co., Carteret, N. J.
Elimination of antimony in refining of copper.
Production of copper of high purity (99.99+ per cent Cu).
Smelting of low-grade copper-bearing materials.
Recovery of smelter by-products.
Recovery of metals from complex ores and residues.

United Verde Copper Co., Research Department, Clarkdale, Ariz.
Recovery of zinc, cadmium, selenium, thallium, lead, sulphur, and iron from complex copper sulphide ores.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research (in cooperation with the United States Bureau of Mines), Salt Lake City, Utah.
Separation of impurities from zinc concentrates by volatilization.
Study of the roasting of zinc ores as a preparation for hydrometallurgical treatment to secure maximum solubility of zinc.

Vanderbilt University, Department of Geology, Nashville, Tenn.
Manufacture and properties of ferrophosphorus.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
The manufacture of sulphate from Taxewell County (Virginia) manganese ore

Western Precipitation Co., 1016 West Ninth Street, Los Angeles, Calif.
The recovery of metals by means of volatilization.

University of Wisconsin, Department of Mining and Metallurgy, Madison, Wis.
The electrolytic zinc method applied to southwest Wisconsin zinc concentrates.

University of Wisconsin, Department of Mining and Metallurgy (in cooperation with Engineering Foundation), Madison, Wis.
Physical metallurgy of blast-furnace slags.

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X. Steel and Alloy Steel Manufacture

University of Akron, Department of Chemistry, Akron, Ohio.
Preparation of pure Fe-Cr alloys.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
Forging, heat-treatment, physical testing and coefficient of expansion of special steels.

American Cyanamid Co., 535 Fifth Avenue, New York, N.Y.
Case hardening and heat treatment of iron and steel.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the University of Michigan), 420 Lexington Avenue, New York, N. Y.
Scaling of steel at heat-treating temperatures.
Factors affecting short-cycle malleableizing.
Decarburization of steel in furnace atmospheres at heat-treating temperatures.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Co.), 420 Lexington Avenue, New York, N. Y.
Research on bright annealing.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation and the University of Michigan), 420 Lexington Avenue, New York, N. Y.
The application of heat to forging.

American Hammered Piston Ring Co., Box 758, Baltimore, Md.
Improvement of structure of steel.

American Society of Mechanical Engineers (in cooperation with Carnegie Institute of Technology and various industrial laboratories), 29 West 39th Street, New York, N. Y.
Possibilities and limitations of the type of bearing on the operation of rolling mills.
Forces in the cold rolling of nonferrous metals.
Roll neck forces in hot rolling alloy steels.

Cadillac Motor Car Co., Detroit, Mich.
Development of methods and materials for quickly and economically producing nitrided parts to resist wear and corrosion.

Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.
Methods of annealing chains.

Carnegie Institute of Technology (in cooperation with the American Society of Mechanical Engineers and various industrial laboratories), Schenley Park, Pittsburgh, Pa.
Possibilities and limitations of the type of bearing on the operation of rolling mills.

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Carnegie Institute of Technology--Continued.
Forces in the cold rolling of nonferrous metals.
Roll neck forces in hot-rolling alloy steels.

Carnegie Institute of Technology (in cooperation with the United States Bureau of Mines and the Metallurgical Advisory Board), Schenley Park, Pittsburgh, Pa.
Physical chemistry of steel making.
Distribution of FeO between slag and metal.
Formation and identification of inclusions.
Viscosity of open-hearth slags.
Nonmetallic inclusions in the basic open hearth.
Method of determining inclusions.
Investigation of slag systems: the system FeO-MnO.
Equilibrium between carbon and iron oxide in iron.
Investigation of oxides in acid open-hearth steel.
The solubility of carbon in iron-manganese-silicon deoxidizers.

Case School of Applied Science, University Circle, Cleveland, Ohio.
The denitriding process as applied to steel.

Columbia University, School of Mines, New York, N. Y.
Reactions in open-hearth steel making.

Erie City Iron Works, Erie, Pa.
Production of ferro-alloys.

A. Finkl & Sons Co., 1326 Cortland Street, Chicago, Ill.
Production of a ferrous alloy which will give greater hardness penetratio

Firestone Steel Products Co., Akron, Ohio.
Problems connected with rim rolling, drawing, and stamping of steel.

Firth-Sterling Steel Co., McKeesport, Pa.
Manufacture of tungsten and tantalum hard-metal compositions.

Four Wheel Drive Auto Co., Clintonville, Wis.
Heat treatment and physical testing of iron and steel.

Gardner-Denver Co., Rock Drill Division Laboratory, 39th Avenue and Williams Street, Denver, Colo.
Heat treatment of ferrous alloys to produce best properties for withstanding shock, vibration, and wear.

Gas Industries Co., 2813 Penn Avenue, Pittsburgh, Pa.
Application of oxygen and oxygen enriched air for the production of iron, steel and alloys.

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Metallurgical Advisory Board--Continued.
Formation and identification of inclusions.
Viscosity of open-hearth slags.
Nonmetallic inclusions in the basic open hearth.
Method of determining inclusions.
Investigation of slag systems: the system FeO-MnO.
Equilibrium between carbon and iron oxide in iron.
Investigation of oxides in acid open-hearth steel.
The solubility of carbon in iron-manganese-silicon deoxidizers.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Refinements in steel making.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association), Ann Arbor, Mich.
Scaling of steel at heat-treating temperatures.
Factors affecting short-cycle malleableizing.
Decarburization of steel in furnace atmospheres at heat-treating temperatures.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association and the Surface Combustion Corporation), Ann Arbor, Mich.
The application of heat to forging.

Motor City Testing Laboratory (Inc.), 4410 Elmhurst Street, Detroit, Mich.
The extraction of ferrous alloys from their ores.
The production of alloys from their ores in a 1-step process.
The production of steel from ores in one step.
The production of rare metal and iron alloys.

National Brake & Electric Co., National Steel Foundries, Belleview Place and River, Milwaukee, Wis.
Eliminating nonmetallic inclusions in acid open-hearth steel.

National District Heating Association (in cooperation with the National Tube Co.), 603 South Broadway, Greenville, Ohio.
Manufacture and utilization of pipe.

National Tube Co., Research Laboratory (in cooperation with the National District Heating Association), 4910 Forbes Street, Pittsburgh, Pa.
Manufacture and utilization of pipe.

University of Notre Dame, Notre Dame, Ind.
Carburization of steel, especially with respect to the effect of ferro-alloys mixed with the carburizer.

Ohio State University, Engineering Experiment Station, Columbus, Ohio.
A study of checker brick in the steel industry.

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General Electric Co., Research Laboratory, Schenectady, N. Y.
Production of special alloys, cemented carbide tools, special cutting tools, and permanent magnets.
Rolling and annealing magnetic sheets, silicon steel.
Production of a readily machineable, nonmagnetic, ferrous alloy.

Gillette Safety Razor Co., 15 West 1st Street, South Boston, Mass.
Strip steel and the manufacture of fine edges.

Harvard University, Cambridge, Mass.
Induction annealing.
Rolling with and without tension.
X-ray criteria for optimum annealing of metal castings and forgings.

Heppenstall Co., 4620 Hatfield Street, Pittsburgh, Pa.
Elimination of nonmetallic inclusions from steel.

Holy Cross College, Worcester, Mass.
Nitriding of malleable iron.

Ingersoll Steel & Disc Co., New Castle, Ind.
Methods of rolling and manufacture of high-carbon and alloy sheet steels, including high-speed steel sheets.
The manufacture of soft-center steels for plow shapes.
Production of composite steels consisting of one or more layers of low-carbon and other layers of high-carbon steel of tool-steel grade.
Production of rustless veneered sheets consisting of deep-drawing stock or high-carbon stock coated on one or both sides with a layer of rustless steel.
The manufacture of rustless steel, particularly in the form of sheets, and parts made from sheets.

International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.
Various heat treatments.

Massachusetts Institute of Technology, Department of Mining and Metallurgy, 69 Massachusetts Avenue, Cambridge, Mass.
Gas hardening with ammonia gas.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Steel treatment fellowship.

Metallurgical Advisory Board (in cooperation with the Carnegie Institute of Technology and the United States Bureau of Mines), Pittsburgh, Pa.
Physical chemistry of steel making.
Distribution of FeO between slag and metal.

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Pennsylvania State College, School of Mineral Industries, Department of Metallurgy, State College, Pa.
Nitriding of steel with special study of the effect of catalyzers and of nitriding agents other than ammonia.

The Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, Ill.
Carburization of iron and steel by gases.

Lucius Pitkin (Inc.), 47 Fulton Street, New York, N. Y.
Heat treatment of high-speed steels in controlled atmospheres.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., New York, N. Y., and elsewhere.
Deoxidizer for steel.

Rail Steel Bar Association, 228 North LaSalle Street, Chicago, Ill.
Relation of carbon to proper furnace temperatures in heating rails.
Proper rate of heating of rails.
Elimination of black spots in heating.
Survey of raw materials (rolling dates, sizes, and chemical properties of rails available for rolling).
Inspection methods for control of process.

The Reed Roller Bit Co., Box 1863, Houston, Tex.
Heat treatment of alloy steels.

W. D. Rockwell Co., 50 Church Street, New York, N. Y.
Improved methods to improve quality of heat-treated ferrous metals.

The Stanley P.Rockwell Co., 296 Homestead Avenue, Hartford, Conn.
The heat treatment of steel.

Rodman Chemical Co., Verona, Pa.
Processing and compounding for quenching oils.

Rose Polytechnic Institute, Terre Haute, Ind.
Bright annealing of stainless iron.

Stanford University, Stanford University, Calif.
Regeneration of low-carbon steels.

The Stanley Works, New Britain, Conn.
The manufacture of low-carbon open-hearth steel, higher-carbon steel, alloy, stainless and heat-resisting steels, including hot and cold rolling, and heat treatment to produce strip steel.

Surface Combustion Corporation, 2375 Dorr Street, Toledo, Ohio.
New methods of processing ferrous metals, particularly with regard to their heat treatment.

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Surface Combustion Corporation (in cooperation with the American Gas Association), 2375 Dorr Street, Toledo, Ohio.
Research on bright annealing.

Surface Combustion Corporation (in cooperation with the American Gas Association and the University of Michigan), 2375 Dorr Street, Toledo, Ohio.
The application of heat to forging.

United States Bureau of Mines (in cooperation with Carnegie Institute of Technology and the Metallurgical Advisory Board), Pittsburgh, Pa.
Physical chemistry of steel making.
Distribution of FeO between slag and metal.
Formation and identification of inclusions.
Viscosity of open-hearth slags.
Nonmetallic inclusions in the basic open hearth.
Method of determining inclusions.
Investigation of slag systems: the System FeO-MnO.
The equilibrium between carbon and iron oxide in iron.
Investigation of oxides in acid open-hearth steel.
The solubility of carbon in iron-manganese-silicon deoxidizers.

United States Bureau of Mines, North Central Experiment Station (in cooperati with the University of Minnesota), Minneapolis, Minn.
Separation of manganese, iron, and phosphorus in high-phosphorus spiegel

United States Bureau of Standards, Washington, D. C.
Quenching media.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Investigations of gases in steel.

Vanadium-Alloys Steel Co., Latrobe, Pa.
Cheaper methods of manufacture and new compositions of stainless irons and steels.

Victor Chemical Works, 343 South Dearborn Street, Chicago, Ill.
Utilization of ferro-phosphorus in the metal industries.

R. Wallace & Sons Manufacturing Co., Wallingford, Conn.
Pickling steel knives before tin plating.
Annealing strip steel with least possible scale.

University of Wisconsin, Department of Mining and Metallurgy, Madison, Wis.
Reactions of steel making.

Worcester Polytechnic Institute, Department of Chemistry, Worcester, Mass.
Effect of salts on pickling of iron.

Yale University, New Haven, Conn.
Influence of annealing on transformer characteristics.

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XI. Nonferrous Metal and Alloy Manufacture

Aluminum Co. of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Metallurgy of aluminum and its alloys.

Aluminum Industries (Inc.), 2416-38 Beekman Street, Cincinnati, Ohio.
Heat treating of aluminum alloys.

The American Brass Co., Waterbury, Conn.
The improvement of the properties of copper, copper alloys, zinc alloys, and silver alloys.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation and the University of Michigan), 420 Lexington Avenue, New York, N. Y.
The application of heat to forging.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation), 420 Lexington Avenue, New York, N. Y.
Bright annealing brass and other metals.

American Hammered Piston Ring Co., Box 758, Baltimore, Md.
Improvement of structure of metals to give heat resistance, heat transfer, wear resistance, and corrosion resistance.

Belden Manufacturing Co., 4647 West Van Buren Street, Chicago, Ill.
Annealing copper wire without discoloration.

Bunting Brass and Bronze Company, Toledo, Ohio.
Work hardening and heat treating bronze alloys.

The Cleveland Graphite Bronze Co., 880 East 72nd Street, Cleveland, Ohio.
Production of nonferrous metal alloys for bearings.

Cornell University, College of Engineering, Ithaca, N. Y.
Improvement of crucible furnaces for nonferrous melting.

Fansteel Products Co. (Inc.), North Chicago, Ill.
The manufacture of the rare metals-tungsten, tantalum, molybdenum and columbium.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Production of cemented carbide tools and other special alloys.

Harvard University, Cambridge, Mass.
X-ray criteria for optimum annealing of metal castings and forgings.

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Harvard University, Harvard Engineering School, Cambridge, Mass.
Silver tarnishing and detarnishing.

State University of Iowa, Department of Chemistry, Iowa City, Iowa.
Preparation of alloys of barium and of strontium.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Production of stainless silver.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association and the Surface Combustion Corporation), Ann Arbor, Mich.
The application of heat to forging.

Montana State School of Mines, State Bureau Mines and Geology, Butte, Mont.
Age hardening of copper alloys.

Motor City Testing Laboratory (Inc.), 4410 Elmhurst Street, Detroit, Mich.
The alloying of rare metals with iron.

The J. M.Ney Co., 71 Elm Street, Hartford, Conn.
Production and fabrication of precious metal alloys for dental uses.

Pennsylvania State College, School of Mineral Industries, Department of Metallurgy, State College, Pa.
Flow of metal in the forging and extrusion of brass.

Lucius Pitkin (Inc.), 47 Fulton Street, New York, N.Y.
Preparation of die-casting alloys for pen-point material (iridium substitutes), dental alloys, improved jewelry alloys, and spectroscopically pure gold.

Rensselaer Polytechnic Institute, Troy, N. Y.
Preparation of metallic zirconium.

Rensselaer Polytechnic Institute, Department of Chemistry and Chemical Engineering, Troy, N. Y.
Study of the relationship between cold working, annealing, and crystal size in brasses.

W. S. Rockwell Co., 50 Church Street, New York, N. Y.
Improved methods to improve quality of heat-treated nonferrous metals.

Rodman Chemical Co., Verona, Pa.
Processing and compounding for quenching oils.

Surface Combustion Corporation, 2375 Dorr Street, Toledo, Ohio.
New methods of processing nonferrous metals, particularly with regard to their heat treatment.

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Surface Combustion Corporation (in cooperation with the American Gas Association), 2375 Dorr Street, Toledo, Ohio.
Bright annealing brass and other metals.

Surface Combustion Corporation (in cooperation with the American Gas Association and the University of Michigan), 2375 Dorr Street, Toledo, Ohio.
The application of heat to forging.

United States Bureau of Standards, Washington, D. C.
Quenching media.

Vanadium-Alloys Steel Co., Latrobe, Pa.
Manufacturing methods and new compositions of tungsten carbide cutting materials.

R. Wallace & Sons Manufacturing Co., Wallingford, Conn.
Nontarnishable finish for sterling silver and plated ware.
Sterling silver alloys that will not tarnish.
Soldering nickel-silver hollow handles so as not to leave pinhole effect in seams.

XII. Casting and Melting

Ajax Electric Furnace Corporation, Frankford Avenue below Girard, Philadelphia, Pa.
Electric induction methods for melting nonferrous metals.

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Value of gray cast iron under conditions of sliding friction.
Wearing test of chilled cast iron under conditions of impact and abrasion.

Allis-Chalmers Manufacturing Co. (in cooperation with the University of Michigan), Milwaukee, Wis.
Intermittent creep tests of 500 pounds per square inch at 850° F. for 2,000 hours on forged and cast steels.

Aluminum Industries (Inc.), 2416-38 Beekman Street, Cincinnati, Ohio.
Casting of aluminum alloys.

American Cast-Iron Pipe Co. (in cooperation with the American Society for Testing Materials), Birmingham, Ala.
Chemical analyses, transverse tests, impact tests, and hardness determinations on cast iron.

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American Foundrymen's Association (in cooperation with the United States Bureau of Standards), 222 West Adams Street, Chicago, Ill.
Development of a method of measuring liquid shrinkage of cast metals.

American Gas Association (in cooperation with the American Gas Furnace Company and Mr. Robert Guthrie, consulting metallurgist), 420 Lexington Avenue, New York, N. Y.
Application of gas heat to brass melting.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the C. M. Kemp Manufacturing Company), 420 Lexington Avenue, New York, N. Y.
Development of gas immersion heating elements for galvanizing tanks.

American Gas Association, Committee on Industrial Gas Research (in cooperation with C. M. Kemp Manufacturing Co. and the Consolidated Gas Co. of New York), 420 Lexington Avenue, New York, N. Y.
Development of immersion stereotype melting equipment.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the University of Michigan), 420 Lexington Avenue, New York, N. Y.
The application of heat to core baking.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the Surface Combustion Corporation), 420 Lexington Avenue, New York, N.Y.
Brass melting, recuperator system.

American Gas Furnace Co. (in cooperation with the American Gas Association and Mr. Robert Guthrie, consulting metallurgist), Elizabeth, N. J.
Application of gas heat to brass melting.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Correlation of properties of iron castings and test bars.

American Society for Testing Materials (in cooperation with industrial, university and government laboratories), 1315 Spruce Street, Philadelphia, Pa.
Impact tests, hardness determinations, compression tests on cast iron.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
Comprehensive study of the properties of cast irons with a view to developing irons of superior quality, especially with reference to properties at elevated temperatures.

Bond Manufacturing Corporation, Monroe and 5th Street, Wilmington, Del.
Casting or formation of tin and lead blanks for collapsible tubes.

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Bunting Brass and Bronze Co., Toledo, Ohio.
Sand casting of bronze alloys.
Chill casting of bronze alloys (permanent mold and centrifugal).

Cadillac Motor Car Co., 2860 Clark Avenue, Detroit, Mich.
Cold melting, duplexing, and triplexing gray iron with electric furnaces, in the manufacture of high-strength gray iron.
Methods of manufacturing babbitted bearings and casting babbitt into backs.

Cochrane Corporation, 17th Street below Allegheny Avenue, Philadelphia, Pa.
Investigation of properties and use of good-quality grey iron.
Cast iron to resist temperatures up to 750°F.
High-strength cast iron.

Consolidated Gas Co. of New York, Laboratories (in cooperation with the American Gas Association and the C. M. Kemp Manufacturing Co.), 4 Irving Place, New York, N.Y.
Development of immersion stereotype melting equipment.

Crane Co., 836 South Michigan Avenue, Chicago, Ill.
Improvement in founding practice.

The Deister Concentrator Co., 901 Glasgow Avenue, Fort Wayne, Ind.
Recovery of metals from foundry residue and other waste materials.

The De Laval Separator Co., Poughkeepsie, N. Y.
Melting electric cast iron.
Development and casting of brass and bronze parts in electric furnace.
Development, melting, and utilization of aluminum alloys.

Detroit Steel Casting Co., 4069 Michigan Avenue, Detroit, Mich.
Various metallurgical influences on the sand casting of steel.
Controlling factors of mold actions on solidifying steel.
Heat treatment in relation to sand-cast steel structure.

Electric Steel Founders Research Group, 541 Diversey Parkway, Chicago, Ill.
Shop technique and metallurgical problems involved in the manufacture of steel castings.

Electro Refractories Corporation, 66 Andrews Building, Buffalo, N.Y.
Development of refractories (brick and cements) from magnesite, aluminum and plastic clays, for use in ferrous and nonferrous foundries.

Ford Motor Co., Dearborn, Mich.
Development of high-strength alloyed and heat-treated cast irons.
Direct casting of steel forging blanks.

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Four Wheel Drive Auto Co., Clintonville, Wis.
Endurance properties of commercial malleable iron, as compared with straight-carbon cast steel.

General Motors Co. (in cooperation with the American Society for Testing Materials), Detroit, Mich.
Unnotched Charpy impact tests on cast iron.

Mr. Robert Guthrie, Consulting Metallurgist (in cooperation with the American Gas Association and the American Gas Furnace Co.), 122 South Michigan Avenue, Chicago, Ill.
Application of gas heat to brass melting.

Harvard University, Cambridge, Mass.
Influence of gases on casting refined copper.
X-ray criteria for optimum annealing of metal castings and forgings.

The Hoover Co., North Canton, Ohio.
Development of cast irons and steels with greater resistance to erosion and solution by aluminum alloys at temperatures and velocities encountered in pressure die casting.

University of Illinois (in cooperation with the American Society for Testing Materials), Urbana, Ill.
Izod impact tests and compression tests on cast iron.

The International Nickel Co. (Inc.), Development and Research Department, 67 Wall Street, New York, N. Y.
Varieties of nickel-bearing cast irons.

International Nickel Co. (in cooperation with the American Society for Testing Materials), 67 Wall Street, New York, N.Y.
Notched Charpy tests on cast iron.

C. M. Kemp Manufacturing Company (in cooperation with the American Gas Association), Baltimore, Md.
Development of gas immersion heating elements for galvanizing tanks.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association and the Consolidated Gas Company of New York), Baltimore, Md.
Development of immersion stereotype melting equipment.

University of Kentucky, Department of Mines and Metallurgy, Lexington, Ky.
A study of the physical effects of the addition, to aluminum, of relatively small amounts of various alloying substances, including melting procedure, heat treatment, and physical and microscopic testing in both the cast and worked conditions.

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Lafayette College, Easton, Pa.
An investigation of a high tensile strength cast iron.

Lebanon Steel Foundry, Lebanon, Pa.
Corrosion, erosion, and heat resistant cast steels, for all phases of oil distillation and cracking.
Corrosion-resisting cast steels for service exposed to mine water.

Lunkenheimer Co., Beekman Street and Waverly Avenue, Cincinnati, Ohio.
Production of maximum soundness in castings.

Lunkenheimer Co. (in cooperation with the American Society for Testing Materials), Beekman Street and Waverly Avenue, Cincinnati, Ohio.
Tensile tests, shear tests, and falling-weight drop tests on cast iron.

Lynchburg Foundry Co. (in cooperation with the American Society for Testing Materials), Lynchburg, Va.
Tension tests of cast iron.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Cast iron fellowship.

University of Michigan, Ann Arbor, Mich.
X-ray examination of steel valve castings for 1,300-pound central-station service.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
The machineability of malleable cast iron.
Foundry work.
Coke pig iron.
X-ray examinations of castings.
Shrinkage of brass in melting in different furnace atmospheres.

University of Michigan (in cooperation with the Allis-Chalmers Manufacturing Co.), Ann Arbor, Mich.
Intermittent creep tests of 500 pounds per square inch at 850°F. for 2,000 hours on forged and cast steels.

University of Michigan, Department of Engineering Research (in cooperation with the American Gas Association), Ann Arbor, Mich.
The application of heat to core baking.

University of Michigan (in cooperation with the American Society for Testing Materials), Ann Arbor, Mich.
Notched Izod impact tests on cast iron.

University of Michigan, Department of Engineering Research (in cooperation with the Utilities Research Commission (Inc.)), Ann Arbor, Mich.
Brass melting by city gas.

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Mississippi Valley Research Laboratory, 660 South 18th Street, St. Louis, Mo.
Development of high-strength cast iron and its alloys.

Montana State School of Mines, Butte, Mont.
Effect of various methods of pouring upon the formation of pipe in ingots.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Utilization of metallic zinc in cast form, including zinc-base alloys for die casting.

The J. M. Ney Co., 71 Elm Street, Hartford, Conn.
The use of precious metal alloys for dental purposes, including methods of casting, soldering, heat treating.

Packard Motor Car Co., Detroit, Mich.
Comparison of gray iron from the cupola and electric furnace for quality, uniformity, cost, and suitability for automotive cast iron parts.

Rensselaer Polytechnic Institute, Troy, N. Y.
Radiographic examination of castings and various structures.

Robbins and Myers (Inc.), Springfield, Ohio.
The synthesizing of high-test cast iron, including the selection of raw materials, proper amalgamation in an electric furnace, and suitabl disposition of the melted metal.
Methods and means of annealing and tempering high-test cast iron.

Foster D. Snell, Consulting Chemist, 130 Clinton Street, Brooklyn, N. Y.
Improvement of molding methods for iron-foundry practice, particularly the development of molds which can be used repeatedly.

Stanford University, Department of Mining Engineering, Stanford University, Calif.
Vertical centrifugal casting of steel with controlled central cavity.

Surface Combustion Corporation (in cooperation with the American Gas Association), 2375 Dorr Street, Toledo, Ohio.
Brass melting, recuperator system.

United States Bureau of Standards, Washington, D. C.
Fluidity of cast iron.
Rubber as a foundry core binder.

United States Bureau of Standards (in cooperation with the American Society for Testing Materials), Washington, D. C.
Charpy impact tests and direct tensile impact tests on cast iron.

United States Bureau of Standards (in cooperation with the American Foundrymen's Association), Washington, D. C.
Development of a method of measuring liquid shrinkage of cast metals.

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United States Pipe & Foundry Co., Burlington, N. J.
Development of high-strength cast iron.

Utilities Research Commission (Inc.) (in cooperation with the University of Michigan), 72 West Adams Street, Chicago, Ill.
Brass melting by city gas.

Walworth Alabama Co., Attalla, Ala.
Corrosion of cast iron and alloyed cast iron.
Casting strains in cast pipe of above materials.
Temperature conditions in pipe molds.
The effect of phosphorus on the strength of high-test gray iron.
Development of high-test gray iron having maximum strength.

University of Wisconsin (in cooperation with the American Society for Testing Materials), Madison, Wis.
Fatigue tests and Russell impact tests on cast iron.

XIII. Electroplating and Metallic Coating

AC Spark Plug Co., Flint, Mich.
Application of electroplating.

American Can Co., Research Department, 11th Avenue and St. Charles Road, Maywood, Ill.
The physical properties and chemical composition of tin plate.

American Chemical Paint Co., Ambler, Pa.
Application of phosphoric acid in metal protection and finishing.

American Electro-Platers Society (in cooperation with the United States Bureau of Standards), 434 South Wabash Avenue, Chicago, Ill.
Corrosion tests of plated deposits on ferrous metals.
Electroplating methods.
Rust protection and rust prevention.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the C. M. Kemp Manufacturing Co.), 420 Lexington Avenue, New York, N. Y.
Development of gas immersion heating elements for galvanizing tanks.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Tin plate, galvanized sheet and terne plate production, testing, and utilization.

American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.
Accelerated tests for protective coatings.

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I.C. 6637

Barber-Colman Co., Rockford, Ill.
Improvements in methods for electroplating cadmium and zinc.

C. G. Buchanan Chemical Co., Baker Avenue, Norwood, Cincinnati, Ohio.
Cleaning parts and surfaces of copper, brass, aluminum, die castings, zinc, and other metals preparatory to electroplating, enameling, galvanizing, painting, or lacquering.

Cadillac Motor Car Co., Detroit, Mich.
Method of measuring electroplated coatings.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
Tests on metallic coatings, both dipped, sprayed, and plated for a variety of protective applications.

The De Laval Separator Co., Poughkeepsie, N. Y.
Use and recovery of tin in tinning processes.

University of Denver, University Park, Denver, Colo.
Electroplating of the rare metals.

Firestone Steel Products Co., Akron, Ohio.
Brass plating.
Cyanide zinc plating.

Firestone Tire & Rubber Co., Akron, Ohio.
Brass plating.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Calorizing (coating with aluminum).

The Glidden Co., Cleveland, Ohio.
Cadmium plating.

Grasselli Chemical Co., Cleveland, Ohio.
The manufacture and use of cadmium products for electroplating.

The International Nickel Co. (Inc.), Development and Research Department, 67 Wall Street, New York, N.Y.
Nickel plating.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association), Baltimore, Md.
Development of gas immersion heating elements for galvanizing tanks.

Lehigh University, Department of Metallurgical Engineering, Bethlehem, Pa.
Protective values of cadmium and zinc platings against corrosion-fatigue of steel.

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McGean Chemical Co., Keith Building, Cleveland, Ohio.
The electrodeposition of metals.

Marquette University, Department of Chemistry, 1217 Wisconsin Avenue, Milwaukee, Wis.
Influence of temperature, current density, composition of bath, and other variables on hardness, brightness, durability, and other properties of chromium and cadmium plating on various metals.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Protected metals fellowship.

Metals Coating Co. of America, 497 North Third Street, Philadelphia, Pa.
Corrosion protection by sprayed molten metal coatings.
Physical and chemical properties of sprayed molten metal coatings.
Applications of sprayed molten metal coatings in the arts.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Chromium plating.

W. Faitoute Munn, 318 White Street, Orange, N. J.
Extraction of rare earths from various rocks and production of their metals by means of electrodeposition.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Utilization of metallic zinc for protective coatings.

Pacific Gas & Electric Co., 4245 Hollis Street, Emeryville, Calif.
Most economical metal protective coatings for general exposure to weather.

Stanford University, Stanford University, Calif.
Grain structure and cracks in chromium plating.

Udylite Process Co., 3220 Bellevue Avenue, Detroit, Mich.
Development of the cadmium-plating process.
Development of the uses and applications of cadmium plating.

United Chromium (Inc.), 51 East 42nd Street, New York, N.Y.; Laboratories at Waterbury, Conn.
Chromium-plating processes.

United States Bureau of Standards, Washington, D. C.
Physical and mechanical properties of sprayed metal.
Theory of chromium deposition.
Protective value of chromium on steel.
Factors governing the character of deposits of silver plating.
Relative protectige value of nickel, copper, zinc, and cadmium coatings on steel.
Notch propagation in coated metals.

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United States Bureau of Standards (in cooperation with the American Electro-Platers Society), Washington, D. C.
Corrosion tests of plated deposits on ferrous metals.
Electroplating methods.
Rust protection and rust prevention.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
Investigation of the effects of aging metallic brown painted surfaces on paint stability and metal protecting properties when immersed in water.

Washington University, St. Louis, Mo.
Electrodeposition of alloys.

Weisberg and Greenwald, 71 West 45th Street, New York, N. Y.
Investigations in chromium plating.
Investigations in electroplating gold-containing alloys.

Westinghouse Electric & Manufacturing Co., South Philadelphia Works, South Philadelphia, Pa.
The influence of various types and methods of chromium plating on the longevity of blades subjected to vibration.

West Virginia State Highway Department, Charleston, W. Va.
Accelerated corrosion tests on culvert pipe of concrete, cast iron, and corrugated-iron pipe with different coatings.

XIV. Welding

Air Reduction Sales Co., 100 Forrest Street, Jersey City, N. J.
Welding of and cutting of ferrous metals by oxyacetylene process.

American Chain Co. (Inc.), Bridgeport, Conn.
Influence of welding conditions and subsequent heat treatment on the structure of welds.
Weldability of carbon and alloy steels.

American Institute of Electrical Engineers (in cooperation with the Engineering Foundation and Lehigh University), 33 West 39th Street, New York, N. Y.
Utilization of pure iron electrodes for electrical welding.

American Welding Society (in cooperation with the Rensselaer Polytechnic Institute), 33 West 39th Street, New York, N.Y.
Study of structural welding.

Babcock & Wilcox Co., 85 Liberty Street, New York, N. Y.
Methods of testing welds.

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Carnegie Institute of Technology, Bureau of Metallurgical Research, Schenley Park, Pittsburgh, Pa.
Metallographic studies of the welding of medium and high carbon rods.

Carnegie Institute of Technology, College of Industries, Schenley Park, Pittsburgh, Pa.
Application of welding to steam and hot-water heating systems.

Catholic University of America, Washington, D. C.
Study of locked-up stresses caused by welding heat.

Consolidated Gas Co. of New York, 4 Irving Place, New York, N. Y.
Utilization of manufactured gas for cutting and welding.

Cosma Laboratories Co., 1545 East 18th Street, Cleveland, Ohio.
The welding of nonferrous metals.

Detroit Edison Co., 2000 Second Avenue, Detroit, Mich.
Welding investigation as particularly related to Enduro tubes up to 10 inches in diameter for 1,000° F. steam.

Engineering Foundation (in cooperation with the American Institute of Electrical Engineers and Lehigh University), 29 West 39th Street, New York, N. Y.
Utilization of pure iron electrodes for electrical welding.

Fusion Welding Corporation, 103rd Street and Torrence Avenue, Chicago, Ill.
Study of fusion welding.

General Electric Co., Schenectady, N. Y.
A system for direct-current arc welding.
Influence of magnetism on the welding arc.
Classification and physical tests for various types of welded-plate joints.
Tests of metal arc welds.
The welding of ferrous and nonferrous metals by the atomic-hydrogen flame.

Harvard University, Cambridge, Mass.
The welding of rail joints, the welding of pressure vessels, and seven projects dealing with fundamentals of welding.

Independent Contact Manufacturing Co., 540 39th Street, Union City, N. J.
Development of special tungsten-molybdenum alloys for spot-welding purposes.

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International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.
Electric welding.

Lehigh University, Department of Metallurgy, Bethlehem, Pa.
The properties of pure gas-free iron in arc welding.

Lehigh University (in cooperation with the American Institute of Electrical Engineers and the Engineering Foundation), Bethlehem, Pa.
Utilization of pure iron electrodes for electrical welding.

Massachusetts Institute of Technology, Cambridge, Mass.
Examination of welds by the X-ray diffraction method.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Investigation and development of new methods of welding.
Study of brazed joints.
Comparative study of seamless and electrically welded tubing.

Robert Notvest, 457 South Arlington Street, Indianapolis, Ind.
Problems of resistance, electric arc and oxyacetylene welding.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., New York, N. Y., and elsewhere.
Electric pipe welding.

University of Pittsburgh, Pittsburgh, Pa.
Stress distribution in fillet welds.

Purdue University (in cooperation with the Utilities Research Commission), Lafayette, Ind.
Determination of proper welding procedure for welding with manufactured (city) gas.

The Reed Roller Bit Co., Box 1863, Houston, Tex.
Surfacing of tungsten and tungsten carbide metals by welding.

Rensselaer Polytechnic Institute, Troy, N. Y.
The internal stresses produced by fillet welds made by the metallic arc.

Rensselaer Polytechnic Institute (in cooperation with the American Welding Society), Troy, N. Y.
Study of structural welding.

Rice Institute, Mechanical Engineering Department, Houston, Tex.
Friction loss across welded pipe bends.

Sperry Development Co., Manhattan Bridge Plaza, Brooklyn, N. Y.
Nondestructive tests of welds by electric-resistance method.

Stanford University, Department of Mining Engineering, Stanford University, Ca
Welds at elevated temperatures.

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The Superheater Co., 151st Street and Railroad Avenue, East Chicago, Ind.
Forge welding alloy steel.

Union Carbide and Carbon Corporation, Research Laboratory, Thompson Avenue and Manley Street, Long Island City, N. Y.
Development of methods of oxyacetylene welding of corrosion-resisting metals and alloys.
Nondestructive testing of welds by means of the stethoscope and X-ray.

United Gas Improvement Co., 3101 Passyunk Avenue, Philadelphia, Pa.
Corrosion of welded joints.

United States Bureau of Standards, Washington, D. C.
The strength of welded rail joints.
The strength of welded joints in steel tubes for use in aircraft.
Fire tests of welded steel floor construction.

United States Naval Research Laboratory, Bellevue, D. C.
Use of gamma ray for examining welds.

United States Navy, Watertown Arsenal, Watertown, N. Y.
X-ray examination of welds.

Utilities Research Commission (Inc.) (in cooperation with Purdue University), Room 522, 72 West Adams Street, Chicago, Ill.
Determination of proper welding procedure for welding with manufactured (city) gas.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Blacksburg, Va.
Properties of welded joints.

State College of Washington, Engineering Experiment Station, Pullman, Wash.
Study of welded metals under fatigue tests.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Weld testing by measurement of magnetic potentials.
Magnetic testing of butt welds.
Fatigue tests of fillet welds to determine effect of machining, spacing, and size of weld.
Fatigue and impact tests of welds.

Yale University, New Haven, Conn.
Investigation of electrical welds in structural steel.

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XV. Utilization and Development

Allen-Bradley Co., Milwaukee, Wis.
Utilization of copper, brass, aluminum, graphite, and carbon for electrical conductors.
Development of alloys of copper, silver, cadmium and nickel for electrical contacts.

Aluminum Co. of America, Aluminum Research Laboratories, Box 77, New Kensington, Pa.
Working of aluminum.
Engineering properties and applications of aluminum and its alloys.

American Electric Railway Association (in cooperation with the American Society for Testing Materials, National Electrical Manufacturers' Association, and the American Mining Congress), 292 Madison Avenue, New York, N. Y.
Development of standard design of trolley wire (350,000 c.m. size) for mine and other heavy electric-traction uses.

American Engineering Co., Aramingo Avenue and Cumberland Street, Philadelphia, Pa.
Effect of high-temperature preheated air on burning and wasting away of stoker parts.
Effect of high-temperature preheated air on expansion of stoker parts.

American Gas Association, Committee on Industrial Gas Research (in cooperation with the C. M. Kemp Manufacturing Co.), 420 Lexington Avenue, N. Y.
Materials for zinc-base, die-casting, immersion burner tubes.

American Mining Congress (in cooperation with the American Electric Railway Association, the American Society for Testing Materials, and the National Electrical Manufacturers' Association), Washington, D. C.
Development of standard design of trolley wire (350,000 c.m. size) for mine and other heavy electric-traction uses.

American Sheet & Tin Plate Co., Research Laboratory, 210 Semple Street, Pittsburgh, Pa.
Production of zinc chloride flux from zinc residues.
Production of and uses for iron sulphate and other pickling liquor by-products.

American Society of Heating and Ventilating Engineers, 4800 Forbes Street, Pittsburgh, Pa.
Application of copper tubing to steam and hot-water heating systems.

American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.
Survey of foreign and domestic design practice for the construction of pressure vessels and the performance of jacketed vessels.

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American Society of Mechanical Engineers (in cooperation with Lehigh University), 29 West 39th Street, New York, N.Y.
Studies of conical spring design.

American Society of Mechanical Engineers (in cooperation with the United States Bureau of Standards and Engineering Foundation), 29 West 39th Street, New York, N. Y.
Performance and life of wire rope under various conditions of use.

American Society of Mechanical Engineers (in cooperation with various industrial laboratories), 29 West 39th Street, New York, N. Y.
Design of worm gears.

American Society for Testing Materials (in cooperation with the American Electric Railway Association, National Electrical Manufacturers' Association, and the American Mining Congress), 1315 Spruce Street, Philadelphia, Pa.
Development of standard design of trolley wire (350,000 c.m. size) for mine and other heavy electric-traction uses.

Anaconda Lead Products Co., 151st and McCook Avenue, East Chicago, Ind.
Lead compounds in storage batteries.

Automatic Electric (Inc.), 1023 West Van Buren Street, Chicago, Ill.
Treatment of Armco iron for magnetic relays.

The Babcock & Wilcox Tube Co., Beaver Falls, Pa.
Development of alloy (ferrous) tubular products.

Bailey & Sharp Co., Hamburg, N. Y.
Utilization of bismuth in glasses.

Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio.
The study of bearing metals used at the present time, accompanied by the development of superior bearing metals for special services.
Metal roofing materials.
The suitability of various metals and alloys for the production of thin metal sheets.
Extending the use of metal foils.

Bendix Research Corporation, 401 Bendix Drive, South Bend, Ind.
Use of high resistance alloys for automotive and aeroplane work.

Bond Manufacturing Corporation, Monroe and 5th Streets, Wilmington, Del.
Extrusion of tin and lead collapsible tubes.

Brooklyn Edison Co. (Inc.), 380 Pearl Street, Brooklyn, N. Y.
Performance of alloy steel bolting materials at elevated temperatures (up to 800° F.) under field conditions with checks by laboratory studies.

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C. G. Buchanan Chemical Co., Baker Avenue, Norwood, Cincinnati, Ohio.
Cleaning steel, iron, and alloy parts for repair, subsequent operations or for enameling, lacquering, painting, galvanizing, and other coating processes.

Bunting Brass & Bronze Co., Toledo, Ohio.
Development of new alloys for bearing purposes.
Substitution of bronze alloys for tin base babbitt.

Burgess Battery Co., East Main and South Brearly Streets, Madison, Wis.
Utilization of manganese dioxide ores in dry cells.

Cadillac Motor Car Co., 2860 Clark Avenue, Detroit, Mich.
Methods of manufacturing babbitted bearings and casting babbitt into backs.
Development of bearing metals, or materials, which will function without lubrication.
Development of babbitt metals which will withstand high temperature, heavy impact, extreme rubbing.

California Agricultural Experiment Station, College of Agriculture, Davis, Calif.
Comparative field and accelerated use tests of fence posts made from wood treated with various preservatives, concrete of various mixtures, reinforcing and methods of wire fastening, and steel fence posts.

California Division of Highways, Sacramento, Calif.
Study of culvert-metal performance.

The Calorizing Co., 400 Hill Street, Wilkinsburg, Pa.
Development of alloys for resistance to corrosion at elevated temperatures and high strength of materials at elevated temperatures.

Carrier Research Corporation, 750 Frelinghuysen Avenue, Newark, N. J.
A study of high-temperature solders for special applications in the zone from 400 to 1,000° F. and brazes for applications in the zone from 1,300 to 1,800° F., including physical properties, application to various metals, etc.

Cerro de Pasco Copper Corporation, 44 Wall Street, New York, N. Y.
Expansion of the uses and development of new uses for bismuth.

Continental Can Co. (Inc.), Research Department, 4633 West Grand Avenue, Chicago, Ill.
Influence of composition of solder and effect of impurities on working condition, and strength of bond produced.

The De Laval Separator Co., Poughkeepsie, N. Y.
Use of tin in tinning processes.
Reclamation and use of bearing metals and type metals.
Development, melting, and utilization of aluminum alloys.

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Detroit Edison Co. (in cooperation with University of Michigan), 2000 Second Avenue, Detroit, Mich.
Metals at elevated temperatures for use in power service.

Detroit Lubricator Co., 5842 Trumbull Avenue, Detroit, Mich.
Investigation of various metals and alloys for use in the manufacture of metal bellows.

Diamond Power Specialty Corporation, 10340 Oakland Ave., Detroit, Mich.
Development of heat-resisting alloys.

Drackett Chemical Co., 5020 Spring Grove Avenue, Cincinnati, Ohio.
Fabrication of aluminum in special physical forms.

Cooper-Bessemer Corporation, Mt. Vernon, Ohio.
Study of babbitt materials and design.
Valve and valve seat materials and design for Diesel engines.

Cosma Laboratories Co., 1545 East 18th Street, Cleveland, Ohio
Development of nonpassive nickel for anodes.

Dahlstrom Metallic Door Co., Jamestown, N. Y.
Preparation of the surface of ferrous and nonferrous metals for protection and ornamental purposes.

Dardelet Threadlock Corporation, 120 Broadway, New York, N. Y.
Methods of locking screw threads.

The De Laval Separator Co., Poughkeepsie, N. Y.
Development and testing of steels for high-speed centrifuge forgings, tool steels, machine steels, and deep drawing stocks.
Testing and utilization of springs and spring steel.

The Eagle-Picher Lead Co., 134 North LaSalle Street, Chicago, Ill.
Application to customers' uses of alloys of lead, antimony and (or) tin.

Electrolux Servel Corporation, 408 East 111th Street, New York, N. Y.
Developments of alloys suitable for use with aqua ammonia in refrigeration.

Engineering Foundation (in cooperation with the American Society of Mechanical Engineers and the United States Bureau of Standards), 29 West 39th Street, New York, N. Y.
Performance and life of wire rope under various conditions of use.

Fairbanks Co., Glenwood Avenue, Binghamton, N. Y.
Use of ferrous and nonferrous metals in valves.

Falls Electric Furnace Corporation, 660 Grant Street, Buffalo, N. Y.
Uses of metals and alloys at elevated temperatures.

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Fansteel Products Co. (Inc.), North Chicago, Ill.
Uses for the rare metals--tungsten, tantalum, molybdenum and columbium.

Firth-Sterling Steel Co., McKeesport, Pa.
Improvement in stainless steels.
Improvement in structure and hardening qualities of straight-carbon tool steels.
Investigation of alloy tool steels for high production purposes.

University of Florida, College of Pharmacy, Department of Chemistry, Gainesville, Fla.
Utilization of titanium and zirconium minerals.

Ford Motor Co., Dearborn, Mich.
Magnesium alloys for automotive and aircraft uses.

French Battery Co., 2317 Winnebago Street, Madison, Wis.
Manganese dioxide utilization in dry-cell manufacture.

Gardner-Denver Co., Rock Drill Division Laboratory, 39th Avenue and Williams Street, Denver, Colo.
Development of ferrous alloys to have best properties for withstanding shock, vibration, and wear.

General Electric Co., Research Laboratory, Schenectady, N. Y.
Study of cemented tungsten carbide.
Uses of tungsten, molybdenum, copper, aluminum, magnesium, and other metals.
Mercury in boilers and turbines.
Production of tungsten and molybdenum parts.

General Electric Vapor Lamp Co., 410 8th Street, Hoboken, N. J.
Utilization of mercury in gaseous electric devices for use in producing radiant energy and the conversion of alternating or direct current into electricities of other form.

General Motors Research Laboratories, General Motors Building, Detroit, Mich.
Improvement of bond between babbitt and steel backing used in bearing construction.
Development of bearing alloy with frictional quality of babbitt and possessing a high softening point.
Internal combustion engine valve steels.
Heat-resisting alloys for carburizing boxes.

The Geometric Tool Co., New Haven, Conn.
Alloys of copper and aluminum, and their machining qualities.

Georgia State Highway Department, Atlanta, Ga.
Investigation of pipe culverts.

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Agricultural Experiment Station, Experiment, Ga.
Copper-lime dust compared with bordeaux mixture for disease control on varieties of tomatoes.

Grasselli Chemical Co., Cleveland, Ohio.
Improvement in catalysts of platinum or vanadium for the manufacture of sulphuric acid.
The manufacture and use of cadmium products for electroplating.
The utilization of zinc.
The metallurgy of zinc.
The metallurgy of indium.

W. and L. E. Gurley, 514 Fulton Street, Troy, N. Y.
Development of the use of strong light alloys for precision instruments where not only strength is required but also permanence of adjustment.

Handy & Harman, Bridgeport, Conn.
Development and utilization of silver solders, tarnish resisting silver alloys, and white and colored karat gold alloys.
Utilization of sterling silver.
Development of alloys for contact wire.

Harshaw Chemical Co., 1945 East 9th Street, Cleveland, Ohio.
Utilization of chromite.

Harvard University, Cambridge, Mass.
Enameling of iron and steel.

The Hoover Co., North Canton, Ohio.
Development of cast irons and steels with greater resistance to erosion and solution by aluminum alloys at temperatures and velocities encountered in pressure die casting.

Hughes Tool Co., Houston, Tex.
Development of drilling tools for rotary process in oil and gas industry.

Robert W. Hunt Co., 166 West Van Buren Street, Chicago, Ill.
Development of new alloys.

Hunt-Spiller Manufacturing Corporation, 383 Dorchester Avenue, South Boston, Mass.
The development of an iron resistant to growth under elevated temperatures, for example, stoker parts.
Development of an iron resistant to a marked degree to frictional wear and at the same time elevated temperatures.

Agricultural Experiment Station, Urbana, Ill.
Effect of feeding copper and iron salts on the copper and iron content of milk.

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University of Illinois (in cooperation with the Utilities Research Commission (Inc.)), Urbana, Ill.
Breakage of rails.

Independent Contact Manufacturing Co., 540 39th Street, Union City, N. J.
Development of special tungsten-molybdenum alloys for spot-welding purposes.
Development of refractory metallic carbide compositions for tools and dies.

International Harvester Co., 606 South Michigan Avenue, Chicago, Ill.
High-temperature resistant materials.

International Lead Refining Co., 151st and McCook Avenue, East Chicago, Ill.
New outlets for bismuth.

The International Nickel Co. (Inc.), Development and Research Department, 67 Wall Street, New York, N. Y.
Forging steels of various nickel alloys for structural purposes.
Nickel-iron alloys for high-temperature service.
Studies of uses of metals of the platinum group.
Stainless nickel for cooking utensils.

Iowa State College of Agriculture and Mechanic Arts, Engineering Experiment Station (in cooperation with the Iowa State Highway Commission), Ames, Iowa.
Performance of metal pipe culverts, particularly cast-iron pipe and corrugated-metal pipe culverts.

Iowa State Highway Commission, Laboratory (in cooperation with Iowa State College), Ames, Iowa.
Performance of metal pipe culverts, particularly cast-iron pipe and corrugated-metal pipe culverts.

Johns Hopkins University, Baltimore, Md.
Preparation of metals in catalytically active forms.

C. M. Kemp Manufacturing Co. (in cooperation with the American Gas Association), Baltimore, Md.
Materials for zinc-base die casting and immersion-galvanizing burner tubes.

Lehigh University (in cooperation with the American Society of Mechanical Engineers), Bethlehem, Pa.
Studies of conical spring design.

Arthur D. Little (Inc.), 30 Charles River Road, Cambridge, Mass.
Tinned finishes for kitchen ware.

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The Lunkenheimer Co., Cincinnati, Ohio.
Development of new alloys to meet conditions of corrosion, wear resistance, strength, etc., in most economical manner.

Massachusetts Agricultural College, Agricultural Experiment Station, Amherst, Mass.
Magnesium requirements of certain common crop plants.
Relation of aluminum compounds to the ill effects of certain crops when grown in rotation with tobacco.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Steel products fellowship.
Roofing fellowship.

Metals Coating Co. of America, 497 North 3d Street, Philadelphia, Pa.
Applications of sprayed molten-metal coatings in the arts.

Metals Disintegrating Co. (Inc.), Morris Avenue and Lehigh Valley Railroad, Townley, N. J.
Outlet for and method of application for the use of metal powders.

Michigan College of Mining and Technology, Houghton, Mich.
Method of preparing and testing mine-drill steel.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
New copper compounds and alloys.

University of Michigan, Department of Engineering Research, Ann Arbor, Mich.
Permeability to various gases of alloy retorts.
Barium alloys.
Studies of special steels.
Investigations of stainless steel.
Alloys used for metal-cutting tools.
Tool steels used in metal cutting.
Metals for gaskets.
Spring materials.
Heavy plates for boiler drums.

University of Michigan (in cooperation with the Detroit Edison Co.), Ann Arbor, Mich.
Metals at elevated temperatures for use in power service.

Moraine Products Co., 329 East First Street, Dayton, Ohio.
Manufacture of molded products such as porous-metal bearings, from powdered metals, and plain rolled bronze bearings.

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National Electrical Manufacturers' Association (in cooperation with the American Society for Testing Materials, American Electric Railway Association, and American Mining Congress), 420 Lexington Avenue, New York, N. Y.
Development of standard design of trolley wire (350,000 c.m. size) for mine and other heavy electric traction uses.

National Research Council, Highway Research Board, 2101 B Street, N. W., Washington, D. C.
Use of rail-steel reinforcement in highway construction.

National Slag Association, 937 Leader Building, Cleveland, Ohio.
Development of new uses for slag.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Utilization of spiegel iron.
Utilization of metallic zinc in cast form including zinc base alloys for die casting.
Utilization of metallic zinc for protective coatings.
Utilization of metallic zinc in rolled form.

The J. M. Ney Co., 71 Elm Street, Hartford, Conn.
The use of precious metal alloys for dental purposes, including methods of casting, soldering, heat treating.

North Dakota Agricultural Experiment Station, State College Station, Fargo, N. Dak.
Use of mercury and copper compounds in control of surface borne diseases of seeds, including potatoes.

Northwestern University, Evanston, Illinois.
Use of compression steel in reinforced-concrete beams.

Pennsylvania Water & Power Co., Lexington Street Building, Baltimore, Md.
Metals to resist corrosive action of water for submerged parts of water turbine.

Pfanstiehl Chemical Co., Manufacturers Terminal, Waukegan, Ill.
Uses of the rarer metals and their alloys.

Rensselaer Polytechnic Institute, Troy, N. Y.
Improvement of spark plug alloys.

Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill.
The reaction of mercury to various materials in an electrical circuit, especially with reference to the effect on contacting qualities in metering circuits.

Rhode Island Agricultural Experiment Station, Kingston, R. I.
Use of manganese for plant growth.
Toxic effects of aluminum on plants.

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H. H. Robertson Co., Grant Building, Pittsburgh, Pa.
Utilization of steel and its protection in buildings.

Rutgers University, The College of Agriculture, New Brunswick, N. J.
Use of insecticides and fungicides containing arsenic, copper, mercury, and derivatives.
Use of fertilizers including manganese salts, etc.

Henry Souther Engineering Co., Hartford, Conn.
Turbine-blade material.

University of Southern California, Los Angeles, Calif.
Utilization of vanadium catalyst for the oxidation of sulphur dioxide.

Spicer Manufacturing Corporation, 4100 Bennett Road, Toledo, Ohio.
Materials for propeller shafts for motor cars and similar applications.

Splitdorf Electrical Co., Newark, N. J.
Utilization of nonoxidizing contact alloys, strong light-weight alloys, and nonmagnetic hard alloys.

Stackpole Carbon Co., Tannery Street, St. Marys, Pa.
Development and perfection of nonferrous oilless bearings.
Development of copper-graphite and silver-graphite contacts.

Standard Oil Co. of Ohio, Midland Bank Building, Cleveland, Ohio.
Development of tubes and/or metals to withstand high temperatures and/or pressures.

Timken Detroit Axle Co., Detroit, Mich.
Development of bronzes for use as worm wheels in worm-drive automotive axles and industrial gear reductions.

Udylite Process Co., 3220 Bellevue Avenue, Detroit, Mich.
Development of the uses and applications of cadmium plating.

Union Carbide and Carbon Research Laboratories (Inc.), 30 East 42nd Street, New York, N. Y.
Utilization of chromium, tungsten, molybdenum, vanadium, manganese, silicon, zirconium, and other semirare metals.

United Chromium (Inc.), 51 East 42nd Street, New York, N. Y.; Laboratories at Waterbury, Conn.
Chromium-plating applications.

United States Bronze Powder Works (Inc.), Herbert Avenue, Closter, N. J.
Perfecting improved alloys for the manufacture of bronze powder.
Improving polishing process in manufacture of bronze powder.
The coloring of metallic powders by heat or dyestuffs.
The standard of bronze powders.

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United States Bureau of Mines, Petroleum Field Office, San Francisco, Calif.
Hard facing metals for oil-well tools.

United States Bureau of Standards, Washington, D. C.
Investigation of about 25 commercial devices for locking the nut on the bolt and the development of tests to simulate service conditions.
Conservation of tin by use of lead-base bearing metals.
Utilization of platinum and platinum metal alloys.
Utilization of copper-base nonferrous ingot metals.
The fire resistance of sheet-metal garages.

United States Bureau of Standards (in cooperation with the American Society of Mechanical Engineers and Engineering Foundation), Washington, D. C.
Performance and life of wire rope under various conditions of use.

United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
The use of aluminum foil with enclosed dead air space for heat insulating purposes.
Evaluation of gland packings and packing materials by work factor method.

Agricultural College of Utah and Experiment Station, Logan, Utah.
Treating grain with copper carbonate and copper sulphate for control of smut.

University of Utah, Salt Lake City, Utah.
Utilization of alunite as a source of potash and metallic aluminum.

Utilities Research Commission (Inc.) (in cooperation with the University of Illinois), 72 West Adams Street, Chicago, Ill.
Breakage of rails.

Vanadium-Alloys Steel Co., Latrobe, Pa.
Development of new stainless irons and steels.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Virginia Engineering Experiment Station, Blacksburg, Va.
The design of close-wound helical springs.

The Wadsworth Watch Case Co., 5th and Clay Streets, Dayton, Ky.
Fabrication of precious and base metal alloys.

Walworth Co., Statler Building, Boston, Mass.
Ferrous alloys for high pressures and temperatures and resistant to chemicals.

Western Cartridge Co., East Alton, Ill.
Use of special alloys of copper, zinc, tin, lead, and other metals for cartridges.

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Western Clock Co., La Salle, Ill.
Development of proper temper and alloys of brass for new parts.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
Perfecting magnetic iron.

XVI. Safety and Health

Belden Manufacturing Co., 4647 West Van Buren Street, Chicago, Ill.
Development of the best accident-prevention methods in wire drawing.

Cherry Laboratories (Inc.), 126 West 5th Street, Kansas City, Mo.
Restoration of health from lead, mercury, and arsenic poisoning.

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.
Safety and health in zinc mines and smelters.

United States Metals Refining Co., Carteret, N. J.
Elimination of causes for occupational diseases.

United States Public Health Service, Office of Industrial Hygiene and Sanitation, 16 Seventh Street, S. W., Washington, D. C.
Measurement of the lead-poisoning hazard as seen in storage-battery making, including sickness records, physical examinations of the workers, and blood determinations.
Hazards to the health of workers painting watch and clock dials with luminous paint (radium and mesothorium).
Health of workers in dusty trades.
Exposure to the dusts of silver polishing.

State College of Washington, Agricultural Experiment Station, Pullman, Wash.
Toxicity of the insecticide compounds of arsenic.

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E. GENERAL

I. Occurrence, Prospecting, Mining, and Economics

University of Alabama, Arthur R. Bauder, University, Ala.
Method of locating petroleum by means of direct currents of electricity.

Apache Powder Co., Benson, Ariz.
Causes of aging of gelatin dynamites.
Eutectic mixtures of nitroglycerine and nitroglycol.
Methods to reduce noxious gases in products of explosion.
Fundamental principles underlying nitration of glycerol and other higher alcohols.

Atlas Powder Co., Wilmington, Del.
All phases in the manufacture, adaptation, and application of explosives and blasting supplies.

Atlas Powder Co., Reynolds Experimental Laboratory, Tamaqua, Pa.
Development of permissible and other types of explosives for mining, tunneling, quarrying, well-shooting, and seismographical prospecting.
Development of improved types of detonators, squibs, blasting machines, galvenometers, and all blasting accessories for both general and specialized mining, quarrying, well-shooting, and seismographical work.

University of California, Department of Mining, Berkeley, Calif.
Shock losses in ventilation ducts.

Carnegie Institution of Washington, Washington, D. C.
Development of instruments for geophysical prospecting.

Colorado School of Mines, Department of Geophysics, Golden, Colo.
Geophysical prospecting for oil and minerals: a, development of methods and instruments; b, field tests on known geologic conditions; c, tests of physical properties of minerals and rocks.

Columbia University, School of Mines, New York, N. Y.
Development of a method of studying mining problems such as mining methods and subsidence, by means of models and the application of the principle of dynamical similarity.

Georgia School of Technology, Atlanta, Ga.
Georgia economic geology.

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John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York, N. Y.
Critical study of political and commercial policies regarding the development of mineral resources in the light of present knowledge of the character and extent of such resources in Europe.
Deposition of ore minerals from hot aqueous solutions at high pressures.

Harvard University, Cambridge, Mass.
Geological work on pre-Cambrian rocks of the Black Hills of South Dakota.
Geological work at the properties of the San Luis Mining Co. at Tayolita, Durango, Mexico.

Harvard University, Harvard Engineering School, Department of Mining Engineering, Rotch Building, Cambridge, Mass.
Methods of correlating geological and geophysical results.
Methods of microscopical investigation of ores.
Rock pressures and mine support at depth.
Principles of valuation of mining properties.
Mine taxation: Depletion.
Mining at depth.
Economics of the copper industry.

Humble Oil Refining Co., Houston, Tex.
Geophysical exploration for oil and gas deposits by gravimetric and seismic methods.
Studies of electric and magnetic phenomena.

University of Illinois, Department of Geology, Urbana, Ill.
Geology of areas in Illinois, Kentucky, and Canada.

University of Kentucky, Department of Physics, Lexington, Ky.
Development and research work on an electrical and a gravitational method to locate promising structure for oil deposits.

Michigan College of Mining and Technology, Houghton, Mich.
Geophysical methods of prospecting, including electric, seismic, magnetic, and thermal methods.
Earth-resistivity and rock-temperature measurements.
Magnetic permeability of rocks in fields of strength corresponding to earth's field.
Methods of mining, timbering, and slushing.
Absorption of high-frequency waves by various geological formations.
Application of electrical equipment to mining.
Sensitivity of the dip needle.
Measurements of electrical resistivity of minerals and rocks.
Measurements of electrical resistivity of large masses of earth and rock in place with a view to determination of geologic substructure.
Measurements of wave transmission in soils and rocks by geophone methods.

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Michigan College of Mining and Technology--Continued.
Dip-needle and magnetometer surveys.
Measurements of magnetic permeability of rocks at field strengths comparable with earth's field.

Geological Survey of Minnesota, University of Minnesota, Minneapolis, Minn.
Preparation of a geologic map of Minnesota.

Missouri School of Mines and Metallurgy, Department of Mining, Rolla, Mo.
Improvement of core-drilling methods.

Montana State School of Mines, Butte, Mont.
Correlations and mapping of belt rocks in western and northwestern Montana.
Geology of the Flathead (Hog Heaven) mining district, Lake County.
Geology along the Yellowstone trail across Montana.
Geologic map of Montana.

New Mexico School of Mines, Socorro, N. Mex.
The ore deposits of Socorro County, N. Mex., with special attention to the Magdalena district.
Mineral resources of New Mexico and their economic features.

University of Oklahoma, Department of Physics, Norman, Okla.
The magnetic susceptibilities of rocks at field intensities of 0.25 to 10 gauss.

Oregon State Agricultural College, School of Mines (in cooperation with the United States Army Engineers), Corvallis, Oreg.
Industrial survey of mineral resources of the Columbia River Basin (including Willamette River).

Oxweld Acetylene Co., Purox Divisions, 2315 East 52nd Street, Los Angeles, Calif.
Transportation and storage of liquid-oxygen explosives.

Pennsylvania State College, Department of Engineering Research, State College, Pa.
Fundamental problems in measurement of air flow.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
A general study of the economic aspects of the mining and mineral-using industries of Pennsylvania.

Pennsylvania State College, School of Mineral Industries, Department of Geology, Petroleum and Natural Gas, State College, Pa.
The Silurian system in central Pennsylvania.
The stratigraphy of the Helderberg group of Pennsylvania.
The fauna of the Shriver chert of central Pennsylvania.
Heavy residue study of the limestone of central Pennsylvania.

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The Reed Roller Bit Co., Box 1863, Houston, Tex.
Drilling for prospecting and production, with special emphasis on drilling in hard formations and rock.
Investigation of special drilling tools and methods.

Rice Institute, Department of Physics, Houston, Tex.
Preparation of wires for torsion balances used in geophysical prospecting for oil.
Design of sensitive torsion balances of short period.
Theory of seismograph and propagation of seismic waves.

Syracuse University, Syracuse, N. Y.
The petrography of highly metamorphosed sediments in eastern Vermont.
The distinctive characteristics in the hornblendes of the sedimentaries and intrusives.

The Trees Oil Co., Winfield, Kans.
Geophysical investigation of oil-bearing formations.

Trojan Powder Co., Hunsicker Building, Allentown, Pa.
The efficient and safe use of explosives in mining and quarrying.

United States Bureau of Mines, Intermountain Experiment Station, Salt Lake City, Utah.
Possible aid for smaller mine and mill operators.
Aircraft for mining operations.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Safe handling and use of liquid-oxygen explosives.
Investigation of explosions due to explosives.
Inflammability of gases and vapors.
Kinetics and mechanism of gaseous explosions.
The effect of electric and magnetic fields on flame propagation.
The specific heats of gases at high temperatures by the explosion method.
Development of analytical and testing methods for mine explosives.

United States Geological Survey, Washington, D.C.
Areal and structural geological studies bearing on the distribution, character, quantity, and genesis of ore and nonmetallic deposits.
Application of local geologic conditions to the finding of ore.
Computation of production curves for mineral production in certain fields and States. Preparation of mathematical tables for use in computation of production curves.
Geothermal prospecting in mines and in core-drill holes in mining areas.
The chemistry of ore deposition, including studies of the solubility of minerals in natural waters, the alteration of minerals, chemical changes induced by pressure and temperature and other similar subjects of geochemistry.

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(1) Page 276 - Insert in the middle of the page -

United States Bureau of Mines, Washington, D. C.
Mining methods and costs studies for metal and nonmetal ores.
Geophysical methods of prospecting.
Ventilation studies in mining districts of the United States.
Ground movement and subsidence studies in mines.

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United States Geological Survey - Continued
The genesis of oil and natural gas.
Estimation of geologic time by means of genetic relationships between the radioactive elements and correlation with geologic information.
Distribution and abundance of the chemical elements in rocks.
Chemical analysis of rocks, minerals, and other natural products.
Chemical and physical research relating to geochemical and geophysical problems.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research, Salt Lake City, Utah.
Geophysical prospecting - the relationship between electrical conductivity and the frequency of the e.m.f.

Venezuelan Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa.
Seismic wave investigations in connection with geophysical prospecting for petroleum.

Yale University, Department of Geological Sciences, New Haven, Conn.
Secondary enrichment of mineral deposits.
General problems of economic geology.

Yale University, Department of Mining and Metallurgy, 14 Mansfield Street, New Haven, Conn.
Classification and selection of mining methods.

II. Beneficiation and Transportation

Allis-Chalmers Manufacturing Co., Mining Machinery Division, Milwaukee, Wis.
Drying, grinding, roasting, concentration (including flotation), and extraction investigations, including work on oxidized ores.

American Cyanamid Co., 535 Fifth Avenue, New York, N. Y.
New flotation reagents.
Theoretical studies on the mechanism of flotation.

American Smelting & Refining Co., 120 Broadway, New York, N. Y.
Development of flotation reagents.

Ansul Chemical Co., Marinette, Wis.
Development of flotation reagents.

University of California, Department of Mining and Metallurgy, Berkeley, Calif.
Physical and chemical surface relationships applying to flotation.
The mechanical concentration and classification of minerals of closely related density.
The flow of sands, gravels, and clastic rock-materials through orifices and chutes.

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Columbia University, Department of Chemistry, 116th Street and Broadway, New York, N. Y.
Reaction of organic substances at the surface of mineral crystals in flotation (for example, galena and xanthate systems).

Colorado School of Mines, Golden, Colo.
Grinding efficiencies of mills.

Deister Machine Co., 1933-2003 East Wayne Street, Fort Wayne, Ind.
Adaption of concentrating machines to needs of industry.

General Engineering Co., Salt Lake City, Utah; 50 Broad Street, New York, N
Thickening and filtering problems.

University of Idaho and Idaho Bureau of Mines and Geology, Moscow, Idaho.
Fine-grinding studies.
Secondary-crushing investigations.
Effect of chemical reagents on sedimentation rate of pure minerals.
Effect of pure minerals on hydrogen-ion concentration of water solutions of various chemicals.
Conductivity method of determining surface of crushed minerals.
Classification in relation to grinding.
Flotation investigations.

International Electric Smelter & Machine Co., 505-41 Park Row, New York, N.Y
Electromechanical handling of ores.

James Ore Concentrator Co., 35 East Runyon Street, Newark, N. J.
Preparation and beneficiation of minerals in general.

LaMotte Chemical Products Co., McCormick Building, Baltimore, Md.
pH control in differential ore flotation processes.

Michigan College of Mining and Technology, Department of Metallurgy, Houghton, Mich.
Development of ore-dressing machinery.
Photo-electric and photochemical research in ore dressing.
Electrostatic methods of ore separation.

Minerals Separation North American Corporation, 11 Broadway, New York, N.Y.; 220 Battery Street, San Francisco, Calif.
Flotation treatment of ores.

Montana State School of Mines, Butte, Mont.
Effect of grain size on flotation as revealed by a study of synthetic ores and mill products.

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United States Bureau of Mines, Washington, D. C.
Milling and treatment methods and costs studies for metal and nonmetal ores.

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Montana State School of Mines, State Bureau of Mines and Geology, Butte, Mont.
Effect of particle size on flotation.
A study of the flocculation and dispersion of pure minerals.
Application of photo-electric cells to ore dressing.

National Sand and Gravel Association, 545 Munsey Building, Washington, D.C.
Methods of preventing segregation of sizes.

Oliver United Filters (Inc.), Federal Reserve Bank Building, San Francisco, Calif.
Dewatering by filtration and drying during filtration of gravity concentrates and of flotation concentrates.

James W. Pearl, 3700 Lake Park Avenue, Chicago, Ill.
The separation of solids and fluids by the slow-spiral-flow process.

Sharples Specialty Co., 23rd and Westmoreland Streets, Philadelphia, Pa.
The use of centrifugals as clarifiers, dehydraters, separators, or classifiers.

Stanford University, Stanford University, Calif.
The study of electrical polarization in relation to flotation-concentration of ores.
The relationship of the porosity of mineral and other aggregates to angularity of grain and grain-size distribution.

Technical Sales Corporation, Research Laboratory, 79 East 130th Street, New York, N. Y.
Electrostatic separation of minerals and other materials.

United States Bureau of Mines, Intermountain Experiment Station (in cooperation with the University of Utah), Salt Lake City, Utah.
Solubility and consumption of flotation reagents.
The effect of various gases on flotation.
The effect of absorbed gases in minerals on flotation.
Preferential flotation of slimed minerals.
Study of minus 200-mesh products of elutriation in relation to flotation losses.

United States Bureau of Mines, Mississippi Valley Experiment Station (in cooperation with the Missouri School of Mines and Metallurgy), Rolla, Mo.
Laboratory investigation of ball milling.

United States Bureau of Mines, North Central Experiment Station (in cooperation with the University of Minnesota), Minneapolis, Minn.
Explosive disintegration.

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University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research, Salt Lake City, Utah.
- Flotation fundamentals.
- Effect of grain size on differential flotation.
- Is oxidation catalysis the basis of operation of collectors for sulphide minerals?
- The crystal structure of minerals and intermediate metallurgical products as a guide to the improvement of ore dressing and metallurgical processes.
- Depressing agents in flotation.
- Effects of electrolytes on flotation.

University of Utah, Utah Engineering Experiment Station, Department of Mining and Metallurgical Research (in cooperation with the United States Bureau of Mines), Salt Lake City, Utah.
- Solubility and consumption of flotation reagents.
- The effect of various gases on flotation.
- The effect of absorbed gases in minerals on flotation.
- Preferential flotation of slimed minerals.
- Study of minus 200-mesh products of elutriation in relation to flotation losses.

Yale University, Department of Mining and Metallurgy, 14 Mansfield Street, New Haven, Conn.
- Stratification and separation of dry materials.

III. Safety and Health

American Society of Heating and Ventilating Engineers, Research Laboratory, 4800 Forbes Street, Pittsburgh, Pa.
- Heat and moisture exchange between the human body and the surrounding atmosphere.

American Society of Heating and Ventilating Engineers, Research Laboratory (in cooperation with the United States Bureau of Mines), 4800 Forbes Street, Pittsburgh, Pa.
- Development of standards of ventilation for various types of buildings, industries, and mines with a view to improving safety, health, and comfort conditions of occupants and workers.

American Society of Heating and Ventilating Engineers, Research Laboratory (in cooperation with Washington University), 4800 Forbes Street, Pittsburgh, Pa.
- Development of a method for the quantitative measurement of atmospheric dust.

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American University, Graduate School, Washington, D.C.
Dust explosions in industrial plants.

Argco Laboratories (Inc.), 150 West 22nd Street, New York, N. Y.
Equipment control and safety devices utilizing vacuum and gas-filled tubes, photo-cells, and other similar devices.

Atlas Powder Co., Reynolds Experimental Laboratory, Tamaqua, Pa.
Development of explosives having minimum evolution of poisonous products of detonation and combustion for use in poorly ventilated mines and tunnels.
Development of low-freezing explosives for safety and convenience.
Development of explosives with the minimum sensitivity to shock and friction consistent with sure and positive blasting action.
Development of explosives which may be used with safety in contact with inflammable gases and dusts.
Development of safer types of and safety devices for detonators and squibs to make for the elimination of premature explosions, misfires, and hangfires.

University of California, Department of Mining, Berkeley, Calif.
Development of new instrument for measuring cooling power of an environment.

Chicago Subway Commission (in cooperation with the University of Illinois), Chicago, Ill.
Study of proposed ventilation system of new Chicago subway.

Cosma Laboratories Co., 1545 East 18th Street, Cleveland, Ohio.
Control of manhole hazards.

Harvard University, Department of Industrial Hygiene, Boston, Mass.
The elimination of dust in the use of pneumatic tools.
Permissible dustiness.
Methods of estimating and recording dustiness.
Methods of measuring the size of dust particles.
A study of the physiologic significance of the katathermometer indications in relation to comfort, efficiency, and the physiologic reactions of men at rest and at work.
Determination of the effective temperature index for low air velocities (0 to 150 feet per minute).

Harvard University, School of Public Health, Department of Industrial Hygiene, 55 Van Dyke Street, Boston, Mass.
Effects of dusts, fumes, smokes, and gases on men and animals.
Effects of temperature, humidity, and air motion on humans.

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Hercules Powder Co., Wilmington, Del.
Effect of sulphur on the fume from L. F. ammonia dynamites.
Effect of wrapper on dynamite fumes.
Variation in gelatin fumes due to age of powder.

University of Illinois, Engineering Experiment Station, Department of Mechanical Engineering (in cooperation with the Chicago Subway Commission), Urbana, Ill.
Study of proposed ventilation system of new Chicago subway.

Johns Hopkins University, Department of Physiology, Baltimore, Md.
Relation of physiological reactions of humans to atmospheric conditions.
Relation of illumination and ultra-violet light to physiological reactions.

Massachusetts Institute of Technology, Department of Mechanical Engineering, Cambridge, Mass.
Research in air conditioning and ventilation.

Mellon Institute of Industrial Research, Thackeray Avenue and O'Hara Street, Pittsburgh, Pa.
Fellowship on air pollution.

University of Minnesota, Minneapolis, Minn.
Methods of determining dust in air.

Pennsylvania State College, School of Mineral Industries, Department of Mining, State College, Pa.
Action of screens or wire gauzes in arresting flame in a gaseous explosive mixture, with special reference to acetylene (C_2H_2) and air.

University of Pennsylvania, Department of Physiology, Philadelphia, Pa.
Effect of environmental temperature on body temperature.

Polytechnic Institute of Brooklyn, Department of Mechanical Engineering, Brooklyn, N. Y.
Effect of forced exhaust-gas dilution and methods of reducing carbon monoxide in exhaust gases.

Citizens Smoke Abatement League of St. Louis (in cooperation with Washington University), St. Louis, Mo.
Development of an instrument for the quantitative measurement of the amount of solid matter suspended in the atmosphere.

University of South Carolina, Department of Geology, Columbia, S. C.
Toxicity of gases.

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United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
Physiological effects of dusts.
Studies in carbon monoxide pathology.
Treatment of carbon monoxide poisoning.
Health hazards from aniline and dimethyl aniline.
Physiological and pathological action of gases and vapors.
Inflammability of gases and vapors.
Kinetics and mechanism of gaseous explosions.

Washington University, St. Louis, Mo.
Investigation of the germicidal effect caused by passing atmospheric air over heated surfaces.
Factors in garage ventilation.

Washington University (in cooperation with the American Society of Heating and Ventilating Engineers), St. Louis, Mo.
Development of a method for the quantitative measurement of atmospheric dust.

Washington University (in cooperation with the Citizens' Smoke Abatement League of St. Louis), St. Louis, Mo.
Development of an instrument for the quantitative measurement of the amount of solid matter suspended in the atmosphere.

IV. Miscellaneous

American Petroleum Institute (in cooperation with the United States Geological Survey), 250 Park Avenue, New York, N. Y.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

American Society for Testing Materials (in cooperation with Columbia University), 1315 Spruce Street, Philadelphia, Pa.
Study of finely sized material.

American Society for Testing Materials (in cooperation with the New Jersey Zinc Co.), 1315 Spruce Street, Philadelphia, Pa.
Study of subsieve sizes of material.

American Society for Testing Materials (in cooperation with the United States Bureau of Public Roads), 1315 Spruce Street, Philadelphia, Pa.
Study of coarse screens.

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.
Investigation of dry and wet centrifugal scrubbers for use in boiler plants and chemical processes.

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Columbia University (in cooperation with the American Society for Testing Materials), New York, N. Y.
Study of finely sized material.

Detroit Edison Co. (in cooperation with the University of Michigan), 3000 Second Street, Detroit, Mich.
Spectographic analysis of gas.

The Franklin Institute, The Bartol Research Foundation, Whittier Place, Swarthmore, Pa.
The theory of atomic structures and radiations.

University of Michigan (in cooperation with Detroit Edison Co.), Ann Arbor, Mich.
Spectographic analysis of gas.

University of Minnesota, School of Chemistry, Minneapolis, Minn.
Application of X-rays in the study of various metallurgical problems, and of pure minerals.

New Jersey Zinc Co. (in cooperation with the American Society for Testing Materials), 160 Front Street, New York, N. Y.
Study of subsieve sizes of material.

Pennsylvania State College, Department of Engineering Research, State College, Pa.
Fundamental problems in measurement of air flow.

Pennsylvania State College, School of Mineral Industries, State College, Pa.
The application of the microscope to the study of the middle and upper Ordovician of central Pennsylvania.

United States Bureau of Mines, Pacific Experiment Station (in cooperation with the University of California), Berkeley, Calif.
Specific heats of oxides and sulphides.
Heats of formation of oxides and sulphides.
Vapor pressure of oxides.

United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa.
The specific heats of gases at high temperatures by the explosion method.

United States Bureau of Mines, Pittsburgh Experiment Station (in cooperation with Carnegie Institute of Technology), Pittsburgh, Pa.
The effect of electric and magnetic fields on flame propagation.

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United States Bureau of Mines, Rare and Precious Metals Experiment Station (in cooperation with the University of Nevada), Reno, Nev.
The forces acting on dust particles in suspension.

United States Bureau of Public Roads (in cooperation with the American Society for Testing Materials), Washington, D.C.
Study of coarse screens.

United States Bureau of Standards, Washington, D.C.
Metallographic polishing technique.
Development of apparatus and critical study of reagents and procedures for gas analysis.

United States Geological Survey, Washington, D.C.
Determination of the coefficients of diffusivity of solids diffusing into each other at moderate and high temperatures.

United States Geological Survey (in cooperation with the American Petroleum Institute), Washington, D.C.
The determination of the thermal conductivity of gases and its application to the precise analysis of gases.

United States Steel Corporation, Research Laboratory, Kearny, N. J.
Measurement of high temperatures.

Wappler Electric Co. (Inc.), 162 Harris Avenue, Long Island City, N. Y.
Methods and apparatus for X-ray diffraction patterns of metals and minerals.

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